

SCIENCE

By A Group of Supervisors



The Main Book





SECOND TERM



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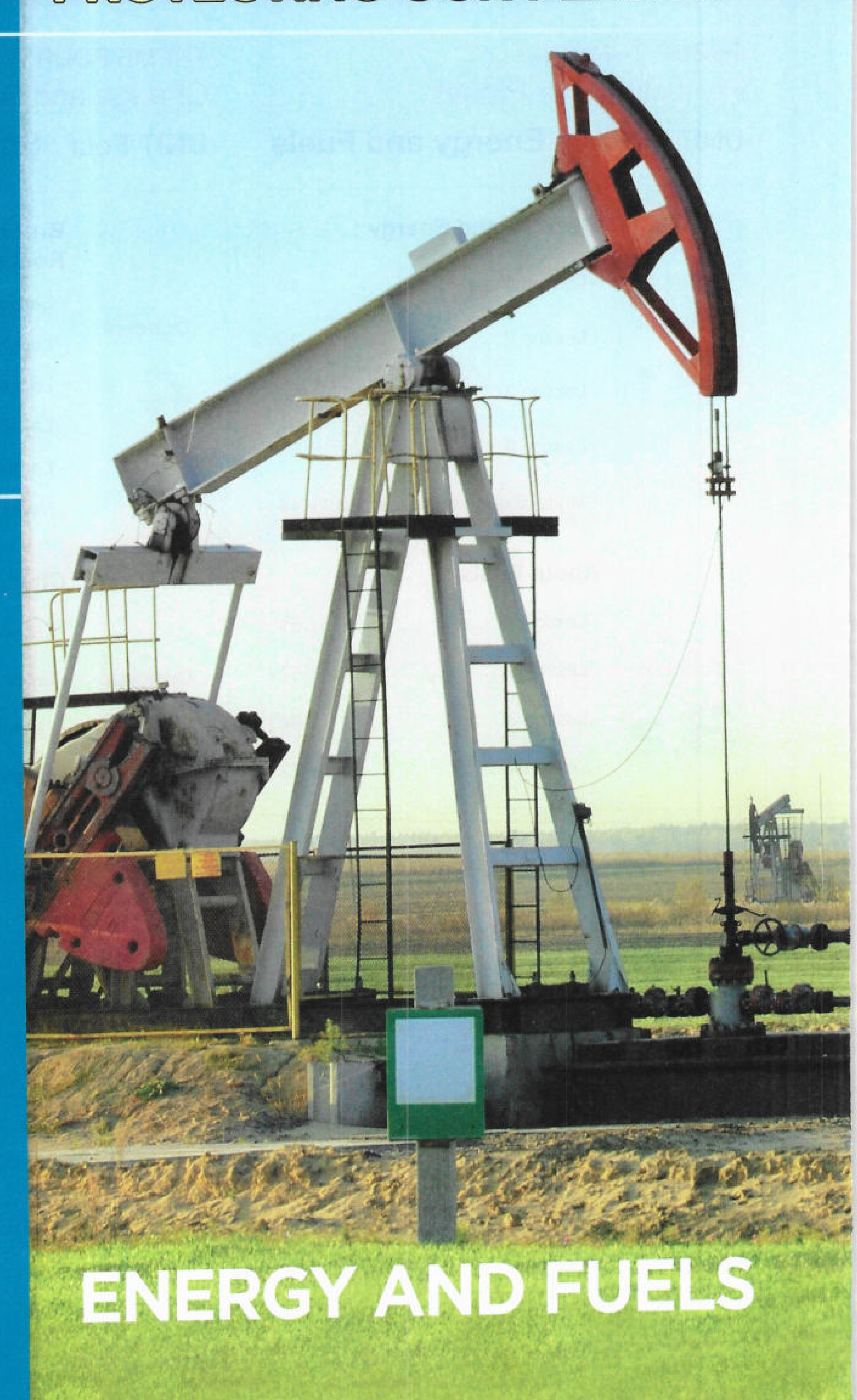
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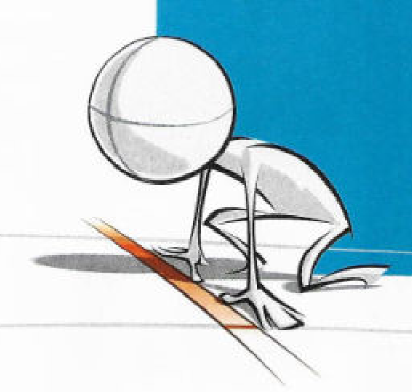
3 UNIT



ENERGY AND FUELS

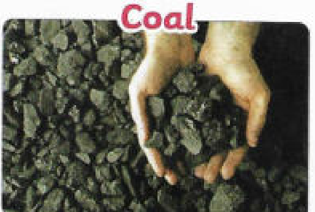
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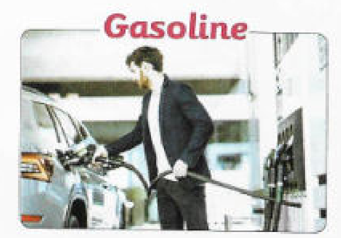
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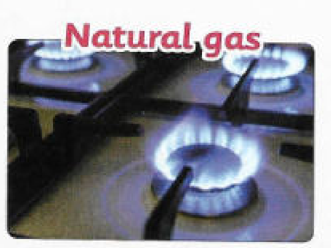


- **During the first term of this year, you have learned the meaning of energy and its relationship with work and movement.**
  In this unit, we are going to learn more about energy and fuel.
- **There are many forms of fuel that man uses in his daily life such as :**







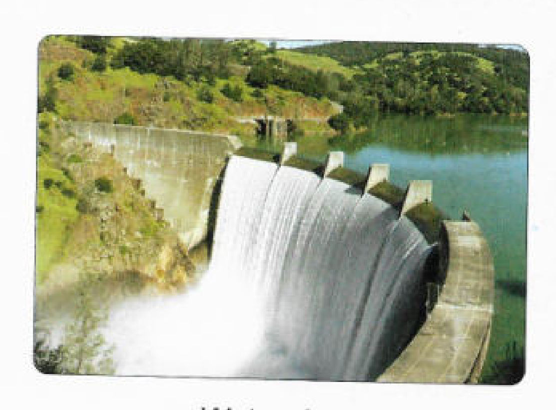


- Man uses the energy produced from burning fuel in many purposes such as cooking, warming, moving cars ....etc.

- Also, man uses the energy produced from burning fuel in generating electricity that is used in lighting lamps and operating devices.

- **In this unit we are going to study :**
- Forms and types of fuel.
- Renewable and non-renewable resources of energy.
- Different uses of solar energy as a renewable resource of energy.
- Using wind and water to generate electricity.
- How we can conserve energy.

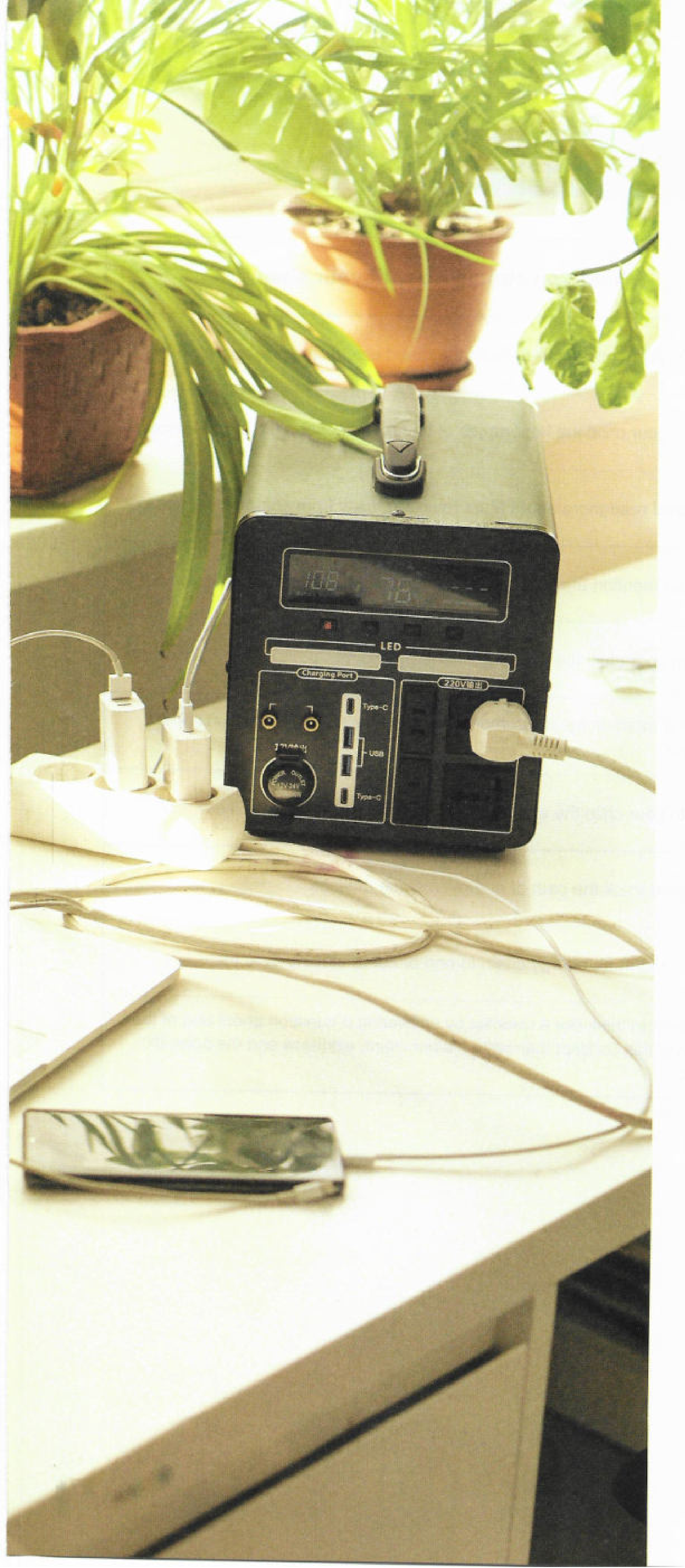
- **Unit Project : The Effect of Building Dams :**
- At the end of this unit, you are going to do a research project about "Water" as one of the energy resources and how to use the kinetic energy of the flowing water of rivers to generate electrical energy by building dams on these rivers.
- You will also search for the effect of the constructing of these dams on the surrounding environment.



Water dam

Concept

3.1 Devices and Energy



Learning outcomes

By the end of this concept, your child will be able to :

- Develop models based on observations that describe how everyday devices transform energy.
- Use observations and evidence to explain how energy is transferred from place to place.

Key vocabulary

- Chemical energy
- Energy transfer
- Earth
- Energy source
- Sun
- Energy conservation

Notes For Parents On Concept (3.1)

Lessons	Activities	What you should do with your child
1	Activity 1	Discuss with your child some devices that need electricity to be operated.
	Activity 2	Discuss with your child the importance of batteries in operating some devices.
	Activity 3	Help your child read more about Mars rover Curiosity from some online sources.
2	Activity 4	Let your child mention the input and output energies in some other devices.
	Activity 5	Discuss with your child the meaning of energy chains.
3	Activity 6	Let your child mention the consumed energy and produced energy in some other devices.
	Activity 7	Discuss with your child the energy transformation while riding a bike.
4	Activity 8	Help your child track the path of energy in some devices.
	Activity 9	Let your child form an energy chain to one of home electric devices.
	Activity 10	Help your child to think like a scientist by answering a question about one of the main points of this concept then write his/her claim, evidence and the scientific explanation.

LESSON ONE





- Most of the energy we use is produced inside the Sun.
- Energy can be changed from one form to another.
- The pictures above show some devices in which energy is converted.

▸ **What types of energy transformations are required for sunlight to operate devices ?**

- Most devices depend on electricity, and to generate electricity, we can convert the energy of the Sun in different ways.
- Different devices can convert the light energy that comes from the Sun into different forms of energy such as in solar powered calculator, the solar cells changes the energy of sunlight (solar energy) into electrical energy which is used to operate the calculator.

▸ **In this concept, we will study :**

- Energy in toy cars that can be controlled remotely.
- Mars exploration rover.
- Energy chains.
- Energy and devices that we use in everyday life.
- Conservation of energy.
- Tracking of energy path.

produce	ينتج	generate	توليد	transformations	التحولات
convert	يتحول	solar cells	خلايا شمسية	operate	عمل
required	مطلوب	devices	أجهزة	energy	طاقة

Activity 2 Energy in Remote-Controlled Cars

▶ **Look at the opposite pictures, then put (✓) or (X) :**

1. The child in picture (1) uses a remote control to move the car. ( )
2. The child in picture (2) can move the car remotely. ( )
3. Both cars in the opposite pictures need electric energy to move. ( )



Picture (1)



Picture (2)

Energy in remote-controlled cars :



- Many toys such as cars, trucks, planes, boats and small robots may operate remotely.
- However, all of these toys need energy to move and perform activities like spinning in the corners and moving forward or backward remotely.

▶ **How do those toys get energy ?**

Batteries inside the toys are the resource of chemical energy that is converted into electrical energy.



The electrical energy is converted into kinetic energy or sound energy to move the toys and make them perform their activities.

▶ **But, what do we do when the batteries of these toys run out ?**

Batteries can be recharged by connecting the device to a nearby charger, or by replacing the old batteries with new ones.





Check your understanding

▶ **Complete the following sentences using the words below :**

(kinetic – chemical – electrical)

1. The energy stored in batteries is .... energy.
2. In batteries of a remote-controlled toy, chemical energy is converted into .... energy, which is converted into .... energy or sound energy.

remote control	جهاز تحكم	electrical energy	طاقة كهربية	trucks	شاحنات	chemical energy	طاقة كيميائية
robot	إنسان آلي	sound energy	طاقة صوتية	perform	أداء / عمل	kinetic energy	طاقة حركة
resource	مصدر	recharge	إعادة شحن	batteries	بطاريات	run out	نفد

Activity 3 Mars Rover

- Have you ever seen a picture of an exploration rover on Mars ?
- This rover shown in the picture below needs energy to be operated, so it can explore Mars. Have you thought about how it gets the energy it requires to be operated ?

Mars exploration rover :

- Mars is about 54 million kilometers away from Earth, so the spacecraft will take about six months to go that distance.
- In the last few years, man has sent many missions to Mars. None of these missions included people, but they had vehicles or robots which are operated remotely.
- The "**Mars rover Curiosity**" is one of the most well-known of these robots which travels on the surface of Mars.



Mars rover Curiosity

- These robots, like remote-controlled toys, require energy to be operated, but the batteries used in the toys cannot be used in Mars rover Curiosity as it is too distant from a store or charger plug or sockets on Earth.

▸ What is the resource of energy that Curiosity exploration rover needs to be operated ?

The Curiosity exploration rover uses solar panels and batteries (which are charged by solar energy) as a resource of energy, where:

The solar panels on the rover convert solar energy into electrical energy, which is used to charge the rover's batteries.	The electrical energy from the batteries powers the vehicle's sensors and the electrical energy is also converted into kinetic energy and thermal energy as the vehicle moves across Mars surface.



Check your understanding

▸ Complete the following sentences using the words below :

(kinetic – electrical – solar)

The solar panels on the Curiosity exploration rover convert .... energy into .... energy, which is converted into .... and thermal energy.

In the Assessment Book :
Try to answer :
Self-Assessment (1)

Mars	كوكب المريخ	vehicles	مركبات	rover	متجول	plug	قابس كهرباء
exploration	استكشاف	solar energy	طاقة شمسية	spacecraft	مركبة فضائية	solar panels	ألواح شمسية
distance	مسافة / بُعد	thermal energy	طاقة حرارية	missions	مهمات	sensors	أجهزة استشعار

Exercises on Lesson 1

● Understand ● Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. The .... on the rover Curiosity convert solar energy into .... energy which is used to charge its batteries. *(Alex. 2023)*
   a. solar panels – electrical b. batteries – electrical
   c. solar panels – sound d. batteries – sound

2. In the battery of a toy car .... energy is converted into electrical energy.
   a. chemical b. sound c. light d. thermal

3. Electrical energy produced from a toy car battery can be converted into .... , ... and .... energies.
   a. kinetic – sound – solar b. kinetic – thermal – solar
   c. kinetic – sound – thermal d. sound – thermal – solar

4. The energy source in a toy car is the .... *(Suez 2023)*
   a. engine. b. tires. c. battery. d. fuel.

5. It takes several .... for a spacecraft to travel from Earth to Mars.
   a. seconds b. minutes c. days d. months

6. Curiosity rover is designed to explore ....
   a. Earth. b. Mars. c. the Sun. d. the moon.

2 Put (✓) or (✗) :

1. Energy cannot be transformed from one form to another. ( )
2. We can convert the solar energy into different forms of energy. ( )
3. A toy car can continue moving even after its battery runs out. *(Giza 2023)* ( )
4. Curiosity is a vehicle that travels across the surface of the planet Mars. ( )
5. Mars is located a few meters away from Earth. ( )
6. Mars rover Curiosity cannot move without electrical energy. ( )

3 Correct the underlined words :

1. The solar energy produced from the moon can be converted into different forms of energy. (......................)
2. Toy cars depend on fuel as a source of electrical energy. (......................)
3. Curiosity is a robotic vehicle that is designed to explore the surface of moon. *(Giza 2023)* (......................)

4 Write the scientific term of each of the following :

1. The source of energy in some toys that stores chemical energy. (....................)
2. The energy produced from batteries. (....................)
3. A robotic vehicle designed to explore the surface of Mars. (....................)

5 Complete the following sentences :

1. The energy can be .... from one form to another.
2. Remote controlled toy car converts .... energy stored in its batteries into .... energy that is converted into .... energy which is used to move the car.
3. To operate an electric mixer we use .... energy.
4. When your cell phone is out of charge, you must recharge its .... to operate it again.
5. Some calculators can change solar energy into .... energy by using the sunlight.
6. On planet Mars, Curiosity robot is operated by using .... energy from sunlight that is converted into .... energy used to recharge its batteries.

6 Give reasons for :

1. A remote-controlled toy car needs a battery to move from one place to another.

   ....

2. Some calculators use the sunlight to operate.

   ....

3. Mars rover Curiosity operates for a long period of time on Mars without any need to be recharged. *(Alex. 2023)*

   ....

7 What happens if ... ?

1. Batteries of remote-controlled toy car run out.

   ....

2. Solar calculators were exposed to the sunlight.

   ....

3. Mars rover Curiosity didn't get any sunlight on Mars surface.

   ....

LESSON TWO

Activity 4 What Do You Already Know About Devices and Energy ?

▶ **Put (✓) or (✗) in front of the following questions :**

1. Television needs sound energy to be operated. ( )
2. Electrical energy is needed to operate an electric fan. ( )

How does energy change (transform) ?

Device	Consumed energy (input energy)	Produced energy (output energy)
Hair dryer	Electrical energy.	Thermal energy and sound energy.
Soap dispenser (Detergent bottle)	Potential energy (stored in the spring of the soap dispenser).	Kinetic energy (the movement of the soap upward).
Washing machine	Electrical energy.	Kinetic energy and sound energy.

Note

When you rub your hands, you will feel warm because kinetic energy (consumed energy) is converted into thermal energy (produced energy).



Check your understanding

▶ **Put (✓) or (✗) :**

1. The consumed energy in the blender is sound energy. ( )
2. The produced energy in remote-controlled toy car is chemical energy. ( )

transform	تحول	hair dryer	مجفف شعر	potential energy	طاقة وضع	rub	فرك
consumed energy	طاقة مستهلكة	washing machine	غسالة	produced energy	طاقة ناتجة	spring	زنبرك
		blender	خلاط	dispenser	موزع	detergent	منظف

Activity 5 Energy Chains

- You have learned that most of the energy we use is made inside the Sun.
- In this activity, we will discover how energy is transmitted from its resource to the devices we use.

- **Energy chains :**
  - Energy chain is a way to describe the energy flow that occurs when we use different devices.
  - Energy chains often start with the Sun.
  - **Now,** we will study some examples of energy chains.

Energy chain when eating food :

The Sun emits light energy that reaches a plant such as an orange tree.



The green plant converts light energy comes from the Sun into chemical energy, which is stored in the form of sugars inside the plant.



When you eat an orange, your body converts the chemical energy stored inside the fruit into kinetic energy when your body move.



▶ **The following diagram shows the energy chain in the previous example :**

Light energy → Converted into → Chemical energy → Converted into → Kinetic energy

(From the Sun) (Stored inside the plant) (Movement of the human body)

energy chain	سلسلة الطاقة	stored	مُخزن	light energy	طاقة ضوئية
transmitted	تنتقل	flow	تدفق	emit	يشع

Energy chain when heating a pot of water over a fire :

Light energy comes from the Sun causes the growth of trees.



This light energy is converted into chemical energy which is stored in the form of sugars inside the trees.



When the wood of trees is burned, it releases thermal energy which heats the water inside the pot.



▸ The following diagram shows the energy chain in the previous example :

Light energy (From the Sun) → Converted into → Chemical energy (Stored inside the trees) → Converted into → Thermal energy (When burning the wood of trees to heat the water inside the pot)

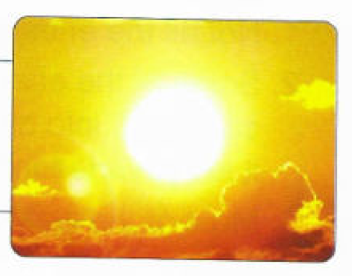
? Give reasons for :

1. **When you go for a walk, there is a change of energy takes place inside your body.**
   Because the chemical energy stored in the food is converted into kinetic energy that helps your body move.
2. **There is a change of energy when burning some wood of trees.**
   Because the chemical energy stored inside the wood of trees is converted into thermal energy.

release	إطلاق	growth	نمو	burned	احترق

Energy chain in a hair dryer :

Light energy from the Sun causes the growth of trees.

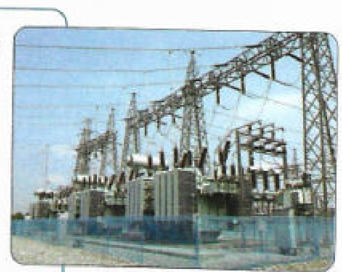


Coal is formed from the remains of dead trees that buried deep in the Earth over millions of years so, coal is a resource of energy that stores chemical energy.



Coal is used in electric power stations (power plant), because :

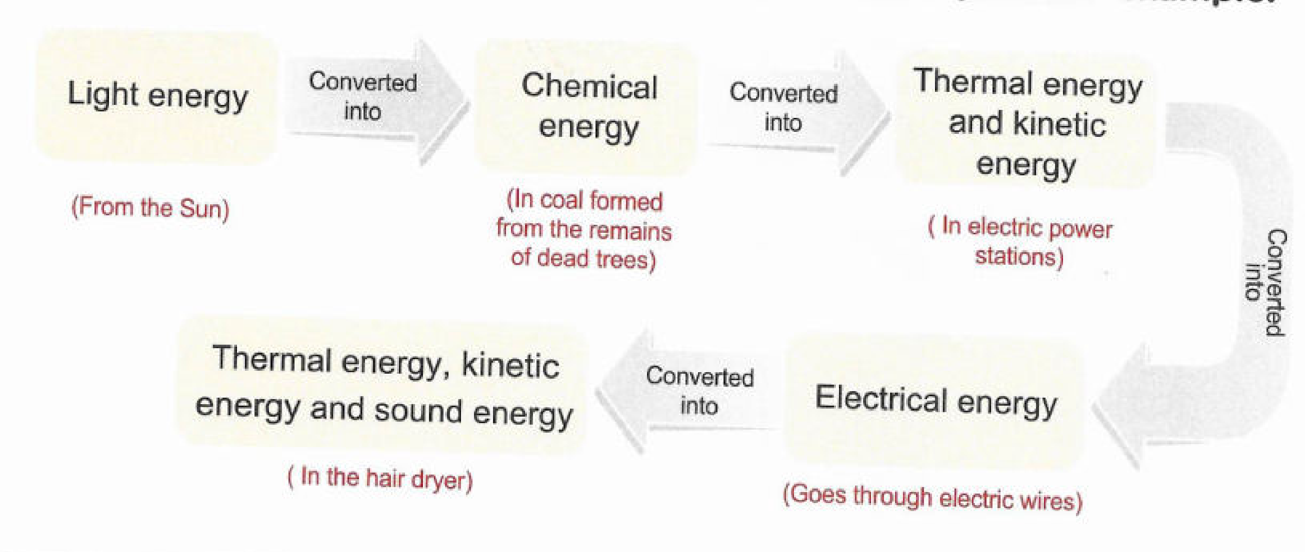
1. When coal is burned, it produces thermal energy.
2. Then thermal energy is converted into kinetic energy which is used to operate certain devices in these stations in order to generate electrical energy.



Electrical energy goes through electric copper wires until it reaches the hair dryer to be operated producing thermal energy, kinetic energy and sound energy.



▸ **The following diagram shows the energy chain in the previous example:**



coal فحم	buried دفنت	electric power station = power plant محطة قوى كهربية
remains بقايا	copper نحاس	

Notes

1. Not all the energy in an energy chain reaches the device.
2. Some of the energy is wasted while travelling through the energy chain, as it is converted into other forms of energy. This is because energy is not destroyed but it is converted into other forms of energy that the device does not use.
3. Most of the wasted energy leaks out in the form of heat.



Check your understanding

▸ Complete the following sentences using the words below :

(heat – chemical – coal – kinetic – Sun – thermal)

1. Most of the energy we use is produced inside the ....
2. When you eat, your body turns the .... energy found in the food into .... energy that helps your body move.
3. In electric power stations, ... is burned to generate thermal energy.
4. In an electric iron, electrical energy is converted into .... energy.
5. In several electrical devices, most of the waste energy leaks out in the form of ....

In the Assessment Book :
Try to answer :
Self-Assessment (2)

waste هدر destroyed دمرت leak تسريب

Exercises on Lesson 2

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. In the hair dryer, the electrical energy is converted into ...., ... and .... energies.
   a. sound – thermal – kinetic
   b. kinetic – light – chemical
   c. thermal – light – chemical
   d. light – sound – chemical
2. In the washing machine, the .... energy is converted into kinetic and sound energies. *(Giza 2023)*
   a. light
   b. electrical
   c. thermal
   d. potential
3. You feel warm when you rub your hands together, because .... energy is converted into thermal energy. *(Cairo 2023)*
   a. kinetic
   b. light
   c. electrical
   d. sound
4. Plants can convert the light energy from the Sun into .... energy which is stored in the plant in the form of sugar.
   a. sound
   b. electrical
   c. chemical
   d. kinetic
5. When you eat an apple, your body converts the .... energy stored in the apple into .... energy when you move.
   a. chemical – electrical
   b. kinetic – chemical
   c. electrical – chemical
   d. chemical – kinetic
6. Electric wires are made of ....
   a. copper.
   b. paper.
   c. wood.
   d. glass.

2 Put (✓) or (✗) :

1. In the soap dispenser, potential energy is converted into kinetic energy. (   )
2. In the electric blender, sound energy is converted into electrical energy and kinetic energy. (   )
3. Most of energy chains starts with the energy of the moon. *(Giza 2023)* (   )
4. Light energy from the Sun helps trees to grow. (   )
5. Both the hair dryer and the washing machine depend on the same kind of energy to operate. (   )

6. In electric power stations, sound energy produced from burning of coal is converted into electrical energy. ( )
7. There is energy waste when energy is transformed from one form to another. ( )
8. Energy can be destroyed inside some devices. ( )

3 Write the scientific term for each of the following :

1. The energy produced from a battery. (.....................)
2. The energy used to operate a television. (.....................)
3. The main source of energy for most forms of energies on Earth. (.....................)
4. The energy produced when the wood of trees is burned. (.....................)
5. The substance that is produced from the remains of dead trees that buried deep in the Earth over millions of years. (.....................)
6. The energy stored in coal. (.....................)

4 Complete the following sentences :

1. The energy produced from the battery and used to operate a toy car is .... energy.
2. When you press on the soap dispenser, ... energy stored in its spring is converted into .... energy that moves the soap upward.
3. The energies that are produced from the washing machine are .... energy and .... energy.
4. When you rub your hands together, the .... energy is converted into .... energy.
5. In any energy chain, some of the energy is wasted in the form of ....

5 Give reasons for :

1. There is an energy change when you press the spring of a soap dispenser.

....

2. When you rub your hands together, you feel warm.

....

3. Not all the energy that enters the energy chain completely reaches the device.

....

6 What happens to ...?

1. The change of energy when you turn on the television. *(Cairo 2023)*

....

....

2. The change of energy when you burn a piece of wood.

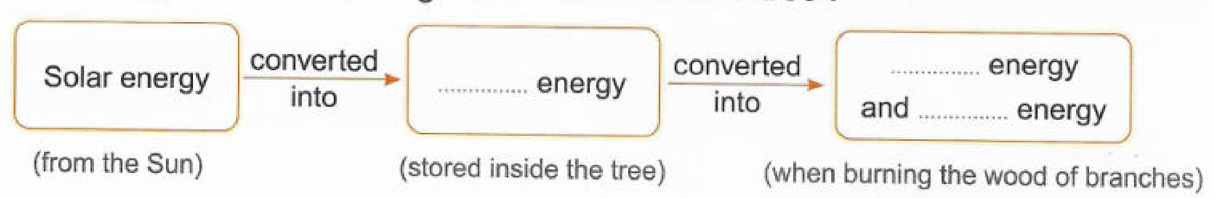
....

....

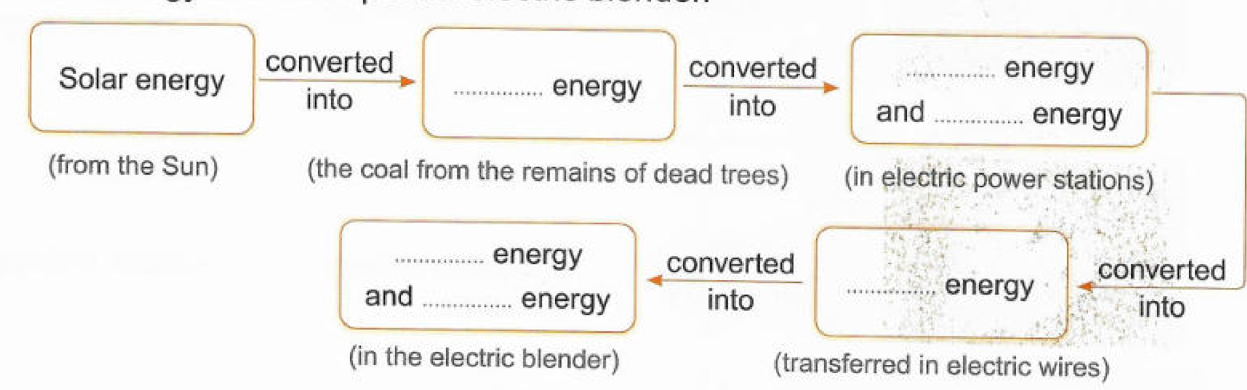
7 **Use the following words to complete the energy chains below. (You may use the same word more than once).**

(Thermal – Chemical – Kinetic – Electrical – Sound – Light)

1. The energy chain of burning some branches of a tree :



2. The energy chain to operate electric blender.



LESSON THREE

Activity 6 Energy and Everyday Devices

▶ **Put (✓) or (✗) :**

1. In the guitar, sound energy is converted into kinetic energy. ( )
2. The consumed energy in the blender is kinetic energy. ( )

- The following table shows the function, the energy consumed and the energy produced in some devices :

Device	Function	Consumed energy (input energy)	Produced energy (output energy)
Electric bulb	Lighting	Electrical energy	Light energy and thermal energy
Battery powered clock	Showing the time	Chemical energy	Kinetic energy
Flashlight	Lighting	Chemical energy	Light energy and thermal energy
Hand bell	Alerting	Kinetic energy	Sound energy
Electric heater	Warming	Electrical energy	Thermal energy

electric bulb	مصباح كهربى	electric heater	مدفأة كهربائية	lighting	إضاءة	alerting	تنبيه
flashlight	مصباح يدوى	warming	تدفئة	hand bell	جرس يدوى		



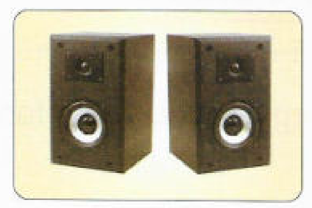
Check your understanding

▶ Write the name of the suitable device below of each sentence :





Washing machine



Speakers



Electric iron



Electric lamp



Drum

1. A device which converts electrical energy into sound energy only.

....

2. A device which converts electrical energy into light energy.

....

3. A device which converts kinetic energy into sound energy.

....

4. A device which converts electrical energy into kinetic energy.

....

5. A device which converts electrical energy into thermal energy only.

....

Activity 7 The Conservation of Energy

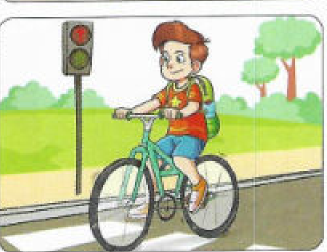
- **Now,** let's study some examples of energy transformation.

Energy chain while riding a bike :

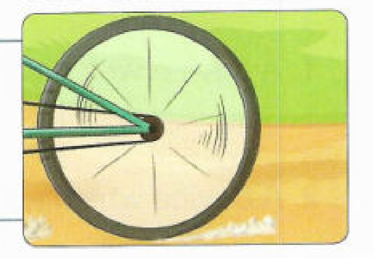
When you eat, the chemical energy stored in the food provides your body with energy.



When you ride your bike and push the pedals, this chemical energy is converted into kinetic energy (mechanical energy), which causes the bike to move.



Some of the kinetic energy, is converted into thermal energy due to the tires friction with the road.



▶ **The following diagram shows the energy chain of the previous example :**

Chemical energy (In food) → Converted into → Kinetic energy (In the bike) → Converted into → Thermal energy (Tire friction with the road)

Energy chain when a light bulb is switched on :

When you turn on a light bulb, the electrical energy that goes through the electrical wires is converted into light energy when it reaches the bulb.



If you put your hand near the light bulb, you can feel heat comes out of the light bulb because some of the electrical energy is also converted into thermal energy.



conservation of energy	حفظ الطاقة	tires	إطارات العجلة	road	طريق
provide	يوفر	pedals	دواسات	friction	احتكاك
mechanical energy	طاقة ميكانيكية	wires	أسلاك		

▶ The following diagram shows the energy chain of the previous example :

Electrical energy	Converted into →	Light energy and thermal energy
(In electrical wires)		(In the light bulb)

▶ From the previous examples, we can conclude that :

Energy can be changed from one form into another, where the new energy cannot be created from nothing, and the old energy does not disappear but it changes from one form of energy into another, this is called **"the law of conservation of energy"**

The law of conservation of energy :

Energy can neither be created nor destroyed, but only converted from one form of energy into another.



Check your understanding

▶ Put (✓) or (✗) :

1. When you ride a bike, some of the kinetic energy is converted into thermal energy due to the friction between tires and the road. ( )
2. Electrical energy is converted into light energy and sound energy when a light bulb is switched on. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (3)

switch on	مفتوح	disappear	تختفي
create	يخلق	destroy	يدمر / يفني

Exercises on Lesson 3

● Understand ● Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. In the electric water kettle, electrical energy is converted into .... energy that can heat the cold water inside it.
   a. potential b. thermal c. electrical d. chemical
2. While playing a guitar, ... energy is converted into sound energy.
   a. kinetic b. light c. chemical d. potential
3. Inside a light bulb, electrical energy is converted into .... and .... energies.
   a. sound – light b. sound – thermal
   c. kinetic – light d. light – thermal
4. When you turn on a light bulb, the electrical energy travels through .... until reaching the bulb.
   a. wires b. glass c. wood d. plastic
5. Both the hair dryer and the electric water kettle produce .... energy.
   a. chemical b. thermal c. electrical d. potential
6. Some kinetic energy is converted into .... energy due to friction of bike's tire with the road.
   a. light b. electrical c. potential d. thermal
7. Which form of energy is not used or produced when you turn on an electric bulb ? ....
   a. Electrical. b. Light. c. Thermal. d. Sound.
8. When you use the hand bell, the .... energy is converted into sound energy.
   a. light b. thermal c. kinetic d. electric
9. Which sentence shows the correct order of energy changes in a flashlight ? ....
   a. Chemical ⟶ electrical ⟶ light. b. Chemical ⟶ light ⟶ electrical.
   c. Electrical ⟶ chemical ⟶ light. d. Light ⟶ chemical ⟶ electrical.
10. If the .... energy doesn't go through the electric fan's wire, it will not turn on.
   a. sound b. electrical c. kinetic d. thermal

2 Put (✓) or (✗) :

1. There is a stored chemical energy inside the food we eat. *(Cairo 2023)* (   )
2. As a result of friction between bike's tires and the road, kinetic energy is converted into chemical energy. (   )

3. When pedalling a bike, the chemical energy in your body is converted into kinetic energy. ( )
4. Energy can't be changed from one form to another. ( )
5. The electric bulb depends on chemical energy to operate. ( )
6. Both the electric bulb and the electric heater produce thermal energy. ( )

3 Write the scientific term for each of the following :

1. A form of energy produced from the electric lamp and affects our eyes. (....................)
2. Energy can neither be created nor destroyed, but only converted from one form into another. *(Dakahlia 2023)* (....................)
3. The energy produced from playing a guitar. *(Giza 2023)* (....................)
4. The energy used to play a drum. *(Minia 2023)* (....................)
5. The energy that is used to operate an electric heater. (....................)

4 Complete the following sentences :

1. When you ride a bicycle, ... energy stored in your food is converted into .... energy which causes the bicycle to move.
2. Some kinetic energy of the bicycle is converted into .... energy due to the friction of its tires with the road.
3. The electric lamp converts .... energy into light energy and .... energy.
4. The change of electrical energy into sound energy in the radio is an example that proves the law of ....
5. Energy can neither be .... nor .... , but only .... from one form to another. *(Cairo 2023)*
6. The electric lamp converts electrical energy into .... energy and .... energy.

5 Give reasons for :

1. You feel heat, when you put your hands near a lighted electric lamp.

....

2. The presence of batteries inside a toy car.

....

6 What happens if ...?

1. You put your hands near the lighted lamp. *(Minia 2023)*

....

2. You shake a small bell with your hand. (according to the change of energy)

....

(Cairo 2023)

7 Look at the following figures, then complete the following sentences :

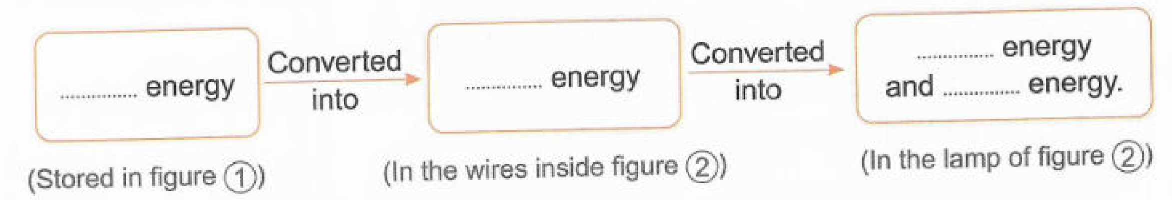


Figure (1)



Figure (2)

1. Figure (1) stores .... energy.
2. Figure (2) needs a source that produces .... energy to be operated.
3. The energy chain that is produced due to inserting figure (1) inside figure (2) and turning it on is :



LESSON FOUR

Activity 8 Follow The Flow

▶ **Look at the opposite picture, then put (✓) or (✗) :**



1. All of the energy that enters the mobile phone (cell phone) is converted into light energy. ( )
2. Some of the energy in the mobile phone comes out as sound energy. ( )

- According to the law of conservation of energy, all the energy that enters a device must finally come out of it, either in the same form or in other forms.
- All devices have energy coming in and out of them, where :
  - The energy that comes in a device is called "input energy".
  - The energy that comes out a device is called "output energy".
- In this lesson, we will learn how the energy used to run a device is converted into other forms of energy, and where it flows.

▶ **The table below shows examples of input energy and output energy in some devices :**

Device	Its function	Input energy	Output energy
Hair dryer	Drying hair.	Electrical energy (In electric wires).	• Thermal energy (Heat produced from the hair dryer). • Sound energy (Sound produced from the hair dryer). • Kinetic energy (Fan movement and airflow inside the hair dryer).
Mobile phone	Ringing, illuminating, and processing information.	Electrical energy (When charging the mobile phone and this electrical energy is stored inside the battery as chemical energy).	• Light energy (Light produced from the mobile phone). • Sound energy (Sound produced from the mobile phone).

enters	يدخل	output energy	الطاقة الخارجة	processing information	معالجة المعلومات
input energy	الطاقة الداخلة	illuminate	يضيء	function	وظيفة

▶ The following diagrams show the energy flow chains of the previous examples :

Energy chain in the hair dryer



(In electric wires) (In the hair dryer)

Energy chain in the mobile phone

Electrical energy → Converted into → Chemical energy → Converted into → Electrical energy → Converted into → Sound and light energies

(When charging the mobile) (Stored in the mobile battery) (To operate the mobile phone) (Produce from the mobile phone)

Notes

1. When we track the path of energy in any device, it looks like the device is losing energy, but the energy is actually being converted into another form, and some of the converted energy is not helping the device do its main function.
2. Noise (sound energy) from a hair dryer is considered as "wasted energy" because sound energy does not help the device do its main function.
3. When using a mobile phone for a long time, some energy is wasted as thermal energy that does not help the device do its main functions.

Check your understanding

▶ Put (✓) or (✗) :

1. Some of the output energy does not help the device do the function for which it was designed. ( )
2. The input energy in the hair dryer is chemical energy. ( )
3. The output thermal energy from a hair dryer is considered wasted energy because it does not help the device do its main function. ( )
4. The mobile phone stores electrical energy in its battery in the form of chemical energy. ( )

path of energy	مسار الطاقة	noise	الضوضاء
track	تتبع	wasted energy	طاقة مهدرة

Activity 9 Build an Energy Chain

- In the previous lessons, you have learned some examples of energy chains.
- **Now,** we will build an energy chain that shows the flow of energy starting with input energy and ending with output energy.

Light energy



The Sun

Converted into

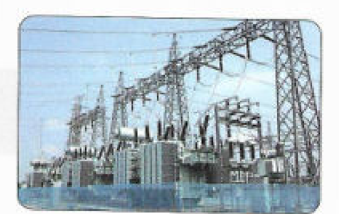
Chemical energy



Coal

Converted into

Thermal energy and kinetic energy



Electric power station (power plant)

Converted into

Electrical energy



Electric wires

Converted into

Kinetic energy

(Energy which helps the blender do its job)

Sound energy and thermal energy

(Wasted energies which do not help the blender do its job)



Blender



Check your understanding

▶ Complete the following energy chain in a television :

.... energy (from the Sun)

Converted into

.... energy (stored in coal)

Converted into

.... energy and .... energy
(in electric power stations)

Converted into

.... energy (in electric wires)

Converted into

.... energy and
.... energy

(Energies which help the television do its job)

.... energy

(Wasted energy which does not help the television do its job)

Activity 10 Record Evidence Like A Scientist

- In this concept, you have learned a lot about energy and how different devices get the energy that they need to be operated.
- In this activity, which will be repeated at the end of each concept, we will learn how to think like scientists to answer a question about one of the main points of this concept through four main steps :

- **Step (1) : The Question.**
- **Step (2) : My Claim.**
- **Step (3) : My Evidence.**
- **Step (4) : My Scientific Explanation.**

Step 1 The Question

What forms of energy transformations must occur for sunlight to operate electrical devices ?

Step 2 My Claim

Forms of energy can be transformed into other forms of energy.

Note

Your claim should be formed of a sentence that gives an answer for the previous question in step (1).

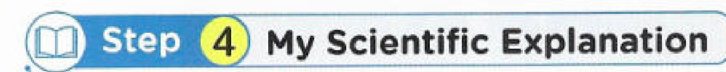
Step 3 My Evidence

- Almost all the energy we use comes from the Sun.
- Energy from the Sun can be converted into other forms of energy by technology.
- Electrical energy is necessary to operate the electrical devices.

Note

You should mention enough and suitable evidence that support your claim.

evidence	دليل	claim	افتراض	scientific explanation	تفسير علمي



Step 4 My Scientific Explanation

- Almost all the energy we use originally comes from the Sun.
- The energy from the Sun is stored as chemical energy in sources like coal that can then be used to produce electricity at a power plant.
- Electrical devices can transform the electricity into other forms of energy, such as :
  - An electrical lamp transforms electrical energy into light and thermal energy.
  - The battery of a cell phone transforms electrical energy into chemical energy stored inside the battery that changes into electrical energy again to operate the cell phone.



Note

Your scientific explanation should explain your claim and evidence introducing some supportive examples from what you have learned.

Review on Concept (3.1)

To review this concept look at the **Assessment Book** **"Part 2 :** Final Revision".

In the Assessment Book :

Try to answer :
- Self-Assessment (4)
- Model Exam on Concept (3.1)

Exercises on Lesson 4

● Understand ● Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. The input energy when using the hair dryer is the .... energy. *(Cairo 2023)*
   a. electrical b. potential c. kinetic d. thermal
2. Which form of energy is not an output energy when a hair dryer is used ? ....
   a. Kinetic energy. b. Electrical energy.
   c. Thermal energy. d. Sound energy.
3. During charging a mobile phone, the .... energy is converted into .... energy that is stored in the phone battery.
   a. electrical – chemical b. chemical – thermal
   c. electrical – thermal d. thermal – chemical
4. Sound and .... energies are output energies when operating the mobile phone.
   a. electrical b. potential c. chemical d. light
5. The output energy when playing drums is the .... energy. *(Minia 2023)*
   a. chemical b. light c. sound d. potential
6. The produced .... energy does not help the blender do its job.
   a. chemical b. sound c. light d. potential
7. When a piece of coal is burned, ... energy is produced.
   a. thermal b. solar c. sound d. potential
8. When a football player runs, the chemical energy inside his body is converted into .... and .... energies.
   a. potential – light b. kinetic – light
   c. thermal – kinetic d. thermal – light

2 Put (✓) or (✗) :

1. Energy may be destroyed inside different devices. *(Cairo 2023)* (   )
2. Some of the converted energy does not help some devices do the function for which it was designed. (   )
3. The produced sound energy helps the hair dryer to do its function. (   )
4. The input energy in a hair dryer is the chemical energy. (   )
5. The energy chain of a burning wood is : Chemical energy —converted into→ Thermal energy and light energy (   )
6. In waterfalls, the water that falls down has kinetic energy. (   )

3 Write the scientific term of each of the following :

1. The energy that is stored in both batteries and food. (....................)
2. The energy that is produced from the electric power stations and flows through wires. (....................)
3. A form of energy that is produced from the electric heater and burning coal. *(Alex. 2023)* (....................)
4. The energy that is produced from the blender and helps it do its job. (....................)
5. The wasted energy when using a mobile phone for a long time. (....................)

4 Complete the following sentences :

1. The mobile phone converts chemical energy stored in its battery into electrical energy that is converted into .... energy and .... energy which are help it to do its function.
2. By using the mobile phone for a long time, some energy is lost in the form of .... energy.
3. The input energy of a hair dryer is .... energy, while the output energies of a hair dryer are .... energy, ... energy and .... energy.
4. The wasted energies that are produced from a vacuum cleaner are .... energy and .... energy.
5. The main function of a blender is done by the help of the produced .... energy. *(Alex. 2023)*
6. The input energy in an electric bulb is .... energy, while its output energies are .... energy and also .... energy which doesn't help in its main function.
7. The input energy when recharging a mobile phone is .... energy which is stored in the form of................. energy inside the phone battery.
8. In the electric heater, ... energy is considered as an input energy, while thermal energy is considered as .... energy.
9. The kinetic energy in a hand bell is considered as .... energy, while in an electric fan is considered as .... energy.

5 Give reasons for :

1. Thermal energy in a mobile phone is considered as a wasted energy.

....

....

2. The electrical energy that enters the hair dryer does not come out of the hair dryer in the same form of energy.

....

....

3. Sound energy and thermal energy are considered as wasted energy in the blender.

....

....

6 What happens if ...?

1. You use a mobile phone for a long time. (according to the wasted energy).

....

....

2. You turn on an electric fan. (according to the change of energy).

....

....

7 Look at the following figures, then complete the following energy chain :

Figure (1) Figure (2) Figure (3) Figure (4) Figure (5)

Energy in figure .... → converted into → Chemical energy stored in figure .... → converted into → Thermal energy and kinetic energy in figure .... → converted into → Electrical energy that is travelled through figure .... → converted into → Thermal energy that is produced from the device in figure ....

Model Exam 

on Concept (3.1)

Total mark

15

1 (A) Choose the correct answer : *(5 marks)*

1. The energy source in a toy car is the ....
   a. engine. b. tires. c. battery. d. fuel.
2. When you use the hand bell, the .... energy is converted into sound energy.
   a. light b. thermal c. kinetic d. electric
3. During charging a mobile phone, the .... energy is converted into .... energy that is stored in the phone battery.
   a. electrical – chemical b. chemical – thermal
   c. electrical – thermal d. thermal – chemical
4. Some kinetic energy is converted into .... energy due to friction of bike's tire with the road.
   a. light b. electrical c. potential d. thermal

(B) What happens if solar calculators were exposed to the sunlight ?

....

....

2 (A) Put (✓) or (✗) : *(5 marks)*

1. Energy can't be changed from one form to another. (   )
2. The produced sound energy helps the hair dryer to do its function. (   )
3. Curiosity is a vehicle that travels across the surface of the planet Mars. (   )
4. In the soap dispenser, potential energy is converted into kinetic energy. (   )

(B) Look at the following figures, then complete the following sentences :

Figure (1)

Figure (2)

1. Figure (1) converts .... energy into .... energy.
2. Figure (2) converts .... energy into .... energy and .... energy.

3. The energy chain that is produced due to inserting figure (1) inside figure (2) and turning it on is :

.... energy	converted into →	.... energy	converted into →	.... energy and .... energy.
(stored in figure ①)		(in the wires inside figure ②)		(in the lamp of figure ②)

3 **(A) Write the scientific term of each of the following :** *(5 marks)*

1. The energy produced from batteries. (.....................)
2. The energy used to play a drum. (.....................)
3. The energy that is produced from the electric power stations and flows through wires. (.....................)
4. The energy produced when the wood of trees is burned. (.....................)

(B) Look at the following figures, then put (✓) or (✗) :

Car (1)
Mars rover Curiosity

Car (2)
Toy car

1. The movement of the two cars can be controlled from a distance by using a remote control. (   )
2. Car (2) uses sunlight to move. (   )
3. The two cars can convert the chemical energy stored in their batteries into electrical energy. (   )
4. We can use an electric cable to recharge the battery that is placed in car (1) again if it runs out. (   )

Model Exam 2

on Concept (3.1)



1 (A) Choose the correct answer : *(5 marks)*

1. In the washing machine, the .... energy is converted into kinetic and sound energies.
   a. light b. electrical c. thermal d. potential
2. You feel warm when you rub your hands together, because .... energy is converted into thermal energy.
   a. kinetic b. light c. electrical d. sound
3. Inside a light bulb, electrical energy is converted into .... and .... energies.
   a. sound – light b. sound – thermal
   c. kinetic – light d. light – thermal
4. When you turn on a light bulb, the electrical energy travels through .... until reaching the bulb.
   a. wires b. glass c. wood d. plastic

(B) What happens if you put your hands near the lighted lamp ?

....

....

2 (A) Correct the underlined words : *(5 marks)*

1. Mars rover Curiosity is designed to explore <u>Earth</u> planet. (......................)
2. Most of energy chains start with the <u>moon</u>. (......................)
3. There is a stored <u>thermal</u> energy inside the food we eat. (......................)
4. The input energy in a hair dryer is the <u>chemical</u> energy. (......................)

(B) Give a reason for the following :

Thermal energy in a mobile phone is considered as a wasted energy.

....

....

3 (A) Write the scientific term of each of the following : *(5 marks)*

1. The energy that is used to operate a television. (......................)
2. Energy can neither be created nor destroyed, but only converted from one form to another. (......................)

3. A kind of energy that is produced from the electric heater and burning coal. (....................)
4. The energy produced from playing guitar. (....................)

(B) Choose from column (A) what suits it in both columns (B) and (C) :

(A) Energy used	(B) The item	(C) Energy produced
1. Kinetic energy	a.	A. Thermal energy.
2. Electrical energy	b.	B. Chemical energy.
3. Solar energy	c.	C. Sound energy.

1. .... → ....   2. .... → ....   3. .... → ....

Concept

3.2 About Fuels





Learning outcomes

By the end of this concept, your child will be able to :

- Describe the ways in how different types of fossil fuels are formed and predict the properties and uses of different types of fossil fuels.
- Describe how the use of energy and fuels affects the environment.

Key vocabulary

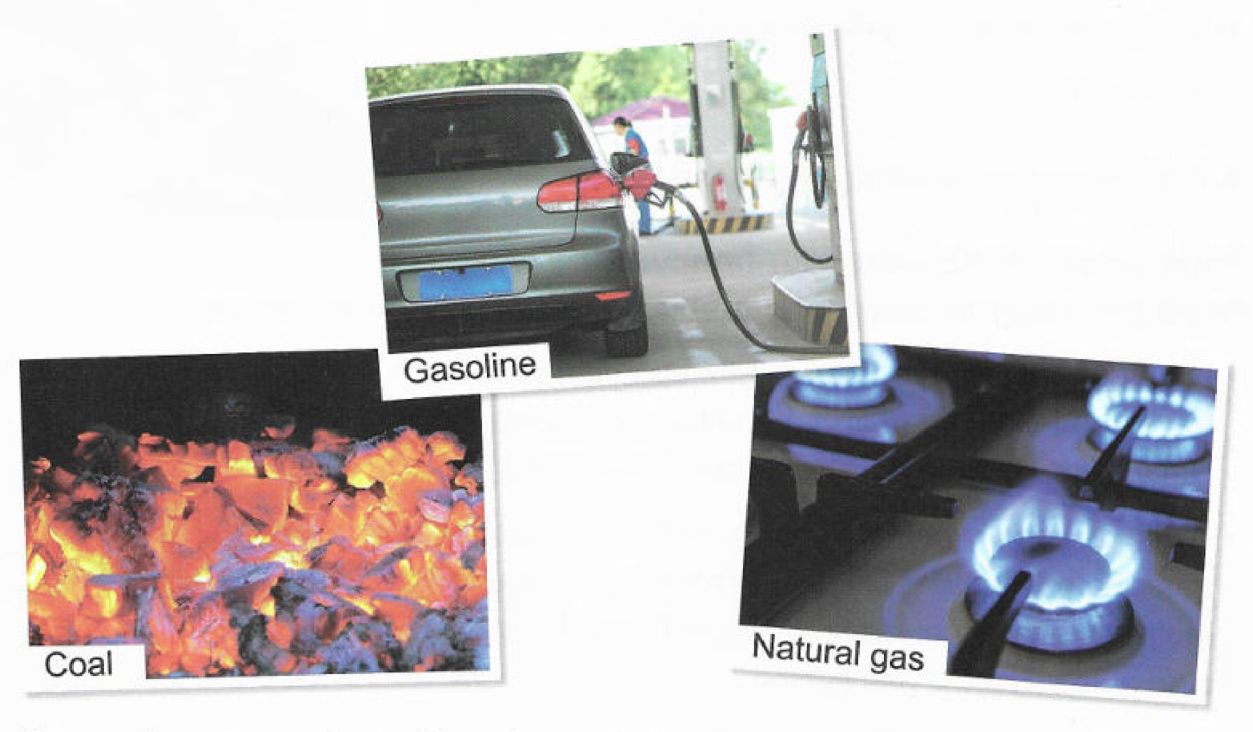
- Energy efficiency
- Nonrenewable energy resources
- Fossil fuels
- Renewable energy resources
- Fuels
- Generate energy
- Pollution

Notes For Parents On Concept (3.2)

Lessons	Activities	What you should do with your child
1	Activity 1	Discuss with your child that any fuel must produce thermal energy when it is burned.
	Activity 2	Discuss with your child the importance of fuel in providing different means of transportation with energy to move.
	Activity 3	Let your child mention some other uses of fuels in our daily life.
2	Activity 4	Discuss with your child the meaning of biofuels and fossil fuels.
	Activity 5	Discuss with your child the formation of oil and how we can conserve oil and water.
3	Activity 6	Let your child arrange the steps of fossil fuel formation.
	Activity 7	Discuss with your child how to conserve the using of electricity.
	Activity 8	Discuss with your child how fossil fuel is used to produce electricity.
4	Activity 9	Discuss with your child the causes of pollution and their effects on human's health.
	Activity 10	Discuss with your child the harms of burning fossil fuels on the environment.
	Activity 11	Discuss with your child some ways to conserve fossil fuels.
5	Activity 12	Let your child classify renewable energy resources and nonrenewable energy resources.
	Activity 13	Help your child to think like a scientist by answering a question about one of the main points of this concept, then write his/her claim, evidence and scientific explanation.

LESSON ONE

Activity 1 Can You Explain ?



- In the previous concept, you have learned about energy chains and that the Sun is the main source of energy.
- Fuel is one of the most important resources of energy that humans depend on to get energy.

Fuel :

It is any substance that produces thermal energy when it is burned.

- **We use fuels in many purposes such as :**
  - Warming our houses.
  - Supply cars with energy to move.

▶ Where does the fuel we use every day come from ?

- The pictures above show several forms of fuels such as gasoline, coal and natural gas that we use in our daily lives, for example :
  Gasoline from the gas stations comes from oil which is extracted from the underground.

▶ In this concept, we will study :

- Types of fuel.
- Fossil fuel formation.
- Conserving fossil fuels.
- Oil and water.
- Using fossil fuels to generate electricity.

resources	مصادر	natural gas	الغاز الطبيعي	depend on	يعتمد على	gas stations	محطات الوقود
purposes	أغراض	extract	يستخرج	supply	يزود	fossil fuel	الوقود الحفرى
coal	الفحم	oil	النفط	gasoline	البنزين	conserve	يحفظ

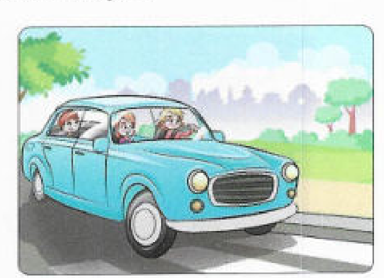
Activity 2 Fuels and Road Trips

▶ **Look at the opposite picture, then put (✓) or (✗) :**



1. Cars can move on roads when they run out of fuel. ( )
2. Cars need fuel to get energy to move. ( )

▶ **Think about a trip with your family using a car.**
Read this story to learn why fuel is so important on road trips.



- One morning, Hany's family woke up and decided to travel to Alexandria to visit aunt Nora, who lives there. Hany, his mother and sister Samar got into the car.
- While driving down the highway, Samar noticed that the gasoline pointer was close to zero and she said to her mother that the fuel was running out and she needed to stop at the nearest gas station.



- Hany's mother drove to the nearest gas station, where a station worker filled the tank and then she drove the car again.



- Hany asked his mother, "Why does a car need fuel to move?" She said the car needs fuel to move because the fuel is burned inside the car engine, allowing the engine to rotate the wheels, so without fuel, the car will not move.

▶ **From the previous story, we can observe that :**

Fuel is important to move cars, where the fuel is burned inside the car engine producing thermal energy that is converted into kinetic energy which causes the car to move.



Check your understanding

▶ **Put (✓) or (✗) :**

1. Cars need a source of energy to move. ( )
2. The fuel is burned inside the car engine, allowing the engine to rotate the wheels. ( )

run out	ينفد	fill	يملأ	trip	رحلة	tank	خزان
highway	الطريق السريع	engine	محرك	notice	يلاحظ	rotate	يدور
pointer	مؤشر	wheels	العجلات	close to	قريب من		

Activity 3 What Do You Already Know About Fuels ?

In this activity, we will learn more about different forms of fuel and their uses.

Uses of some different forms of fuel :

Fuel is used for several purposes, such as :

Coal and wood

They are used in :

Cooking food



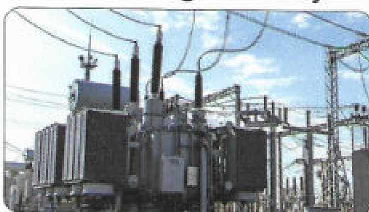
Warming

Gasoline and natural gas

They are used in :



Generating electricity



Operating all means of transportation





Note

Natural gas also can be used in cooking food.



▶ **The following energy chain shows how fuels such as coal can be used to get thermal energy :**

Light energy (From the Sun) → Converted into → Chemical energy (Stored inside coal) → Converted into → Thermal energy (When burning the coal)



Check your understanding

▶ Complete the following sentences using these words :

(thermal – gasoline – natural gas)

1. Fuel is used as a source of .... energy.
2. Burning of .... or .... allows cars to move.

In the Assessment Book :
Try to answer :
Self-Assessment (5)

operate	يشغل	transportation	النقل	means	وسائل

Exercises on Lesson 1

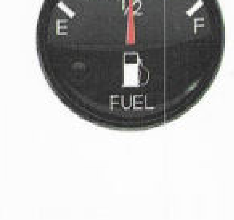
● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. Among the forms of fuel that are present in car fuel stations are ....
   a. gasoline and wood.
   b. natural gas and coal.
   c. wood and coal.
   d. gasoline and natural gas.

2. When the speed of a moving car decreases gradually until it stops, this may happen due to all the following situations, <u>except</u> ....
   a. gasoline is completely run out.
   b. the car engine is damaged.
   c. the driver presses the brakes pedal.
   d. the driver presses the gasoline pedal.

3. The opposite figure represents the fuel indicator of a car, which referes to that the fuel tank ....



   a. is completely empty from gasoline.
   b. is completely full of gasoline.
   c. has half amount of gasoline.
   d. has half amount of water.

4. We can use the energy obtained from burning of wood directly for all of the following purposes, <u>except</u> ....
   a. warming houses.
   b. operating television.
   c. cooking food.
   d. boiling water.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. The Sun. 2. Fuel. 3. Gasoline.	a. it is operated by electricity. b. its light energy changes into chemical energy in plants. c. it is a liquid that can be used as fuel for cars. d. it is any substance that produces thermal energy when it is burned.

1. .... 2. .... 3. ....

3 Put (✓) or (X) :

1. As the speed of a car increases, the amount of used fuel decreases. (   )
2. We must check the amount of gasoline in the fuel tank before making a trip by a car. (   )
3. Both coal and wood produce energy when they are burned. *(Giza 2023)* (   )
4. Natural gas is a form of fuels that can be used in generating electrical energy. (   )
5. When gasoline burned in the car engine, kinetic energy will be produced to move the car. (   )

4 Correct the underlined words :

1. We need <u>sound</u> energy, for cooking food and warming houses. (....................)
2. <u>Coal</u> is the main source of most energies on the Earth's surface. (....................)
3. Fuel is the substance that produces <u>electrical energy</u> on burning. (....................)

(Alex. 2023)

5 Write the scientific term of each of the following :

1. It is the main source of most forms of energy on the Earth's surface. *(Cairo 2023)* (....................)
2. The form of energy that is produced as a result of burning wood and coal. (....................)
3. It is any substance which produces thermal energy on burning. *(Menofia 2023)* (....................)

6 Complete the following sentences :

1. Gasoline is burned inside a car engine to produce .... energy that is converted into .... energy which causes the movement of the car.
2. Some forms of fuel can be used in cooking such as .... , ... and ....
3. We can use some forms of fuel in warming houses such as .... and ....

7 Give reasons for :

1. The fuel is very important for different means of transportation.

....

2. Sometimes the fuel indicator of a car goes down.

....

3. Gasoline is burned inside a car engine.

....

....

8 What happens to ...?

1. The car fuel indicator if the amount of gasoline in a car decreases.

....

....

2. The car movement if fuel runs out in a car.

....

....

9 Look at the opposite picture, then choose the correct answer :

1. Coal is a form of fuel, which is used in all the following purposes, except ....
   a. cooking food.
   b. operating cars.
   c. generating electricity.
   d. warming houses.

Burning coal

2. Coal is burned to produce .... *(Cairo 2023)*
   a. thermal energy.
   b. sound energy.
   c. natural gas.
   d. wood of trees.

3. Coal and .... are used in warming houses.
   a. water
   b. plastic
   c. sand
   d. wood

LESSON TWO

Activity 4 Types of Fuel

▶ **Choose the correct answer from those between brackets :**

1. From the fuels that are used in cooking food is .... (oil – natural gas)
2. From the fuels that are used in generating electricity is .... (coal – wood)

In the previous lesson, you have learned that fuels are substances that, when burned, they release thermal energy.

Types of fuel :

▶ **Types of fuel can be classified into:**

1. **Biofuels**
2. **Fossil fuels**

1. Biofuels

Biofuels :

They are fuels made from living organisms that can be planted (i.e., plants).

Examples :



- **Wood** is the oldest fuel that is still used all around the world.



- **Charcoal** is made from wood and it is an important fuel.



- Some types of plants such as **grass, corn and wood chips** can be used to make a liquid fuel.

- Biofuels are renewable fuels which means that they can be continually renewed as plants grow.
- **Although biofuels are renewable energy resources, they should be conserved, where :**

Using wood as fuel requires cutting down trees. ▶ Cutting down trees at a faster rate than they can grow leads to "deforestation", which has negative effects on the environment. ▶ Therefore, we should conserve using wood, so that it will not run out.

Note

Many trees grow a few centimeters each year, while some trees reach their full height in a period nearly equals the human's lifetime. This means that the growth of these trees takes more than one human's lifetime to complete their growth.

biofuels	الوقود الحيوى	liquid fuel	وقود سائل	charcoal	الفحم النباتي	continually	باستمرار
grass	العشب	require	يحتاج	corn	الذرة	deforestation	إزالة الغابات
wood chips	رقائق الخشب	lifetime	عمر الإنسان	renewable	متجدد	negative	سلبي

2. Fossil fuels

Fossil fuels :

They are fuels formed from the remains of plants and animals that were buried and decomposed over a long period of time.

Examples :



- **Oil and natural gas** were formed from the decomposition of the remains of ancient sea animals.



Note

Gasoline is a fuel made from oil.



- **Coal** was formed from the decomposition of the remains of ancient plants.

- Fossil fuels are nonrenewable fuels which means that they are gone and cannot be easily renewed.

Formation of coal :

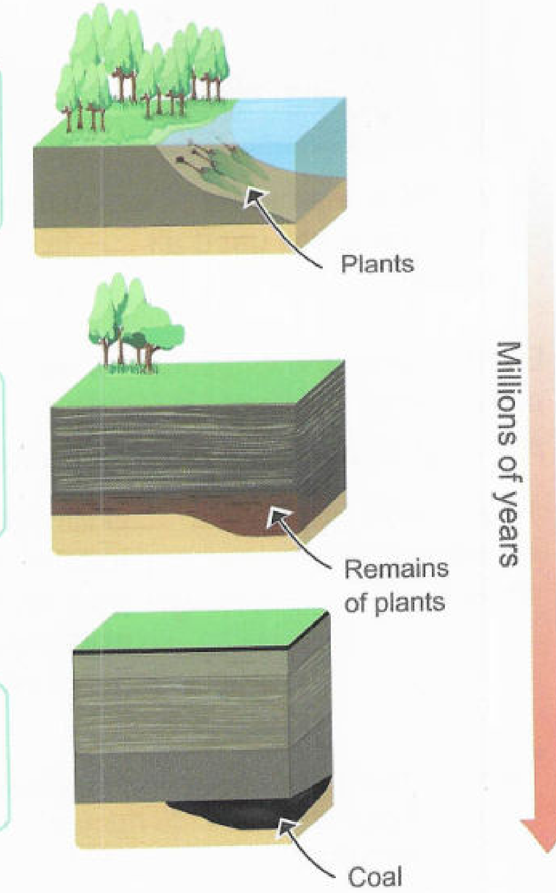
Millions of years ago, large areas of the Earth were covered in swamps, with a lot of plants growing nearby.

↓

When those plants died, their remains were decomposed and covered by hundreds of meters of mud and rocks.

↓

Due to the effect of the Earth's heat and pressure, those remains were turned into **coal**.



form	يتكون	swamps	مستنقعات	decompose	يتحلل
bury	يدفن	pressure	ضغط	nonrenewable	غير متجدد
ancient	قديمة	remains	بقايا	mud	الطين

- Fossil fuels (coal, oil and natural gas) take millions of years to be formed, so they are used faster than they are formed.



Note

The original source of energy in biofuels and fossil fuels is the light energy of the Sun (solar energy).



Check your understanding

▶ **Complete the following table using the words below :**

(living organisms – grass – renewable – oil – corn – nonrenewable – gasoline – millions of years)

Points of comparison	Biofuel	Fossil fuel
Definition :	Fuel made from .... that can be planted.	Fuel made from the remains of living organisms, that takes .... to be formed under certain conditions.
Renewable or nonrenewable :	....	....
Examples :	Wood, ... and	Natural gas, coal, ... and ....

original	أولى / أصلى	certain	معينة
conditions	ظروف	source	مصدر

Activity 5 Oil and Water

Oil and water are two types of resources that humans can use to generate energy.

Formation of oil :

- Oil comes from deep in the ground, where oil formed from the decomposition of sea creatures, as follows :

When the sea creatures died, their remains settled on the sea floor.

↓

Over millions of years, layers of sediments and rocks covered the remains of those sea creatures. These layers pressed down causing extreme heat and pressure.

↓

Over time, as a result of extreme heat and pressure, those remains converted into **oil**.

▶ The following table shows some differences between oil and water and how to conserve each of them :

Oil	Water
• Oil is a nonrenewable energy resource. **Nonrenewable resource :** It is a natural material that is used faster than it can be replaced. **• Conservation of oil :** Oil is used at a rate faster than the formation of new oil, so it should be conserved by many ways such as : - Reducing the use of private vehicles. - Using of public means of transportation.	• Water is a renewable energy resource. **Renewable resource :** It is a natural material that can be replaced soon after it is used. **• Conservation of water :** Water may not be replaced as quickly as we need it, so people should use water carefully to conserve it by many ways such as : - Avoid wasting or polluting water. - Growing plants that do not need large amounts of water for irrigation.

In the Assessment Book :
Try to answer :
Self-Assessment (6)

sea creatures	كائنات بحرية	replace	يستبدل	settle on	يستقر على	natural	طبيعية
ocean floor	قاع المحيط	reduce	يقلل	sediments	الرواسب	public	عام
press	يضغط	private	خاص	extreme	شديد	irrigation	الري

Exercises on Lesson 2

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. All the following are forms of fuel, except .... *(Suze 2023)*
   a. wood. b. natural gas. c. gasoline. d. glass.
2. .... is considered as the main resource of energy on the Earth's surface.
   a. Gasoline b. The Sun c. Natural gas d. The moon
   (Qalyoubia 2023)
3. All the following are renewable resources of energy, except .... *(Cairo 2023)*
   a. natural gas. b. water. c. the Sun. d. wind.
4. Nonrenewable resources of energy take .... to be formed.
   a. a short period of time b. a very long period of time
   c. few minutes d. few hours
5. Ancient people used .... as a fuel before discovering gasoline.
   a. electricity b. water c. wind d. wood
6. Wood is considered as .... *(Alex. 2023)*
   a. biofuel. b. fossil fuel. c. liquid fuel. d. gaseous fuel.
7. Coal was formed under the Earth's surface from the remains of ....
   a. dead animals. b. dead plants.
   c. dead humans. d. dead insects.
8. Extreme heat and pressure under the Earth's surface has an important role in forming .... *(Giza 2023)*
   a. wood. b. wind. c. fossil fuel. d. biofuel.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Water. 2. Wind energy. 3. Coal.	a. it needs extreme heat and pressure to be formed from remains of dead plants. b. it is the main resource of energy on the Earth's surface. c. it is a gaseous renewable resource of energy. d. it is a liquid renewable resource of energy.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. Biofuel is one of nonrenewable resources of energy. *(Qalyoubia 2023)* (   )
2. Extreme cooling under the Earth's surface helps in the formation of oil. (   )

3. Water and gasoline are two renewable resources of energy. *(Cairo 2023)* (   )
4. We have to reduce the usage of the Sun as a source of energy. (   )
5. The rate of usage of oil is slower than its rate of formation under the Earth's surface. (   )
6. The Sun is the main source of forming both biofuel and fossil fuel. (   )
7. We can make a liquid fuel from grass and wood chips. (   )

4 Correct the underlined words :

1. We have to increase planting vegetables and fruits that need a large amount of water. (....................)
2. In houses, gasoline is used in cooking food as it is one of the oldest known biofuels. (....................)
3. The nonrenewable resources of energy take a short period of time to be formed under the Earth's surface. (....................)
4. The moon is the main source of both biofuel and fossil fuel. *(Cairo 2023)* (....................)
5. We can use some animals to make a liquid biofuel. (....................)
6. The rate of usage of fossil fuels must be increased. (....................)
7. Wood is a form of fossil fuels that can be used in houses. (....................)
8. Water is a nonrenewable resource of energy that can be used as a fuel in cooking food and moving cars. (....................)
9. We can conserve oil by increasing the use of private vehicles. (....................)

5 Write the scientific term of each of the following :

1. Natural resources of energy, that take a short period of time to be renewed. (....................)
2. Natural resources of energy that take a very long period of time to be formed. (....................)
3. It is a form of biofuel that can be made from some types of plants such as grass and wood chips. (....................)
4. They are fuels that were formed from remains of dead animals and plants under the Earth's surface. (....................)
5. It is a form of fossil fuel that was formed from remains of dead plants under the effect of extreme heat and pressure. *(Cairo 2023)* (....................)
6. It is a form of fossil fuel that was formed from dead marine animals. (....................)

6 Complete the following sentences :

1. Water is considered from .... resources of energy, while coal and .... are from nonrenewable resources of energy.
2. The natural resources that can be replaced shortly after being used are called .... resources of energy.
3. The natural resources that are consumed at a rate faster than they can be renewed are called .... resources of energy.
4. Different forms of fuel can be classified into two main types which are .... and ....
5. The type of fuel that is produced from living organisms that can be planted is called .... such as wood and ....
6. Wood and .... are examples of biofuel, while .... and .... are examples of fossil fuel. *(Cairo 2023)*
7. Wood chips and grass can be used to make a .... biofuel.
8. Oil formed from the decomposition of .... as a result of extreme heat and ....

7 Give reasons for :

1. Water and wind are considered as renewable resources of energy.

   ....

2. Coal and gasoline are considered as nonrenewable resources of energy.

   ....

3. Using wood of trees as a fuel has negative effects on the environment.

   ....

(Cairo 2023)

8 What happens if ... ?

1. People increase using the wood of trees as a source of fuel.

   ....

2. The remains of dead living organisms were buried under the Earth's surface over millions of years.

   ....

3. Decomposition of remains of sea animals under the Earth's surface.

   ....

LESSON THREE

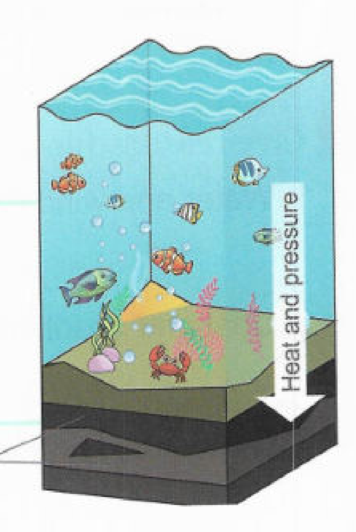
Activity 6 Fossil Fuel Formation

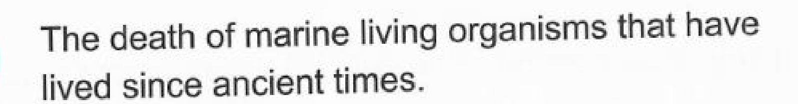
▶ **Arrange the following steps to know how fossil fuel is formed :**

……… The remains of marine living organisms were buried and decomposed under sediments and rocks.

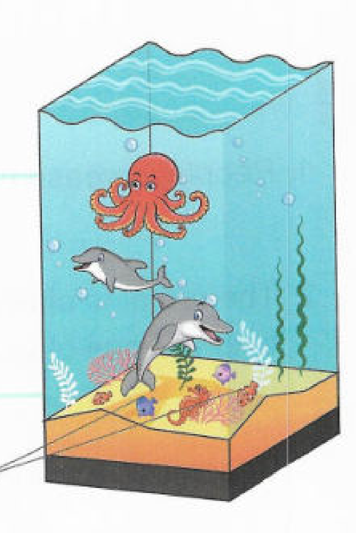
Remains of marine living organisms

……… Due to the effect of extreme heat and pressure, the remains of marine living organisms were turned into **oil** or **natural gas**.





……… The death of marine living organisms that have lived since ancient times.



Activity 7 Living Without Electricity

- You have learned that fossil fuels such as natural gas and oil are nonrenewable energy resources which are used in generating electricity.
- Recently, renewable energy resources such as wind and water (hydropower) are also used to generate electricity.
- **Whatever the resource of energy is renewable or nonrenewable, we should conserve the energy through many ways such as :**

1. Turning off lights when they are not needed.



2. Unplugging electrical devices (appliances) when they are not used.



- **Imagine the electric current being cut off while you were studying, you can use simple ways to keep studying, like :**
  1. Using candles instead of the electric lamps.
  2. Writing with a pen and paper instead of using a computer.
- So, we can conclude that electrical energy is very important in our lives and we should conserve it.

Check your understanding

▸ Look at the following pictures, then put [✓] in front of the picture showing how to conserve electricity :







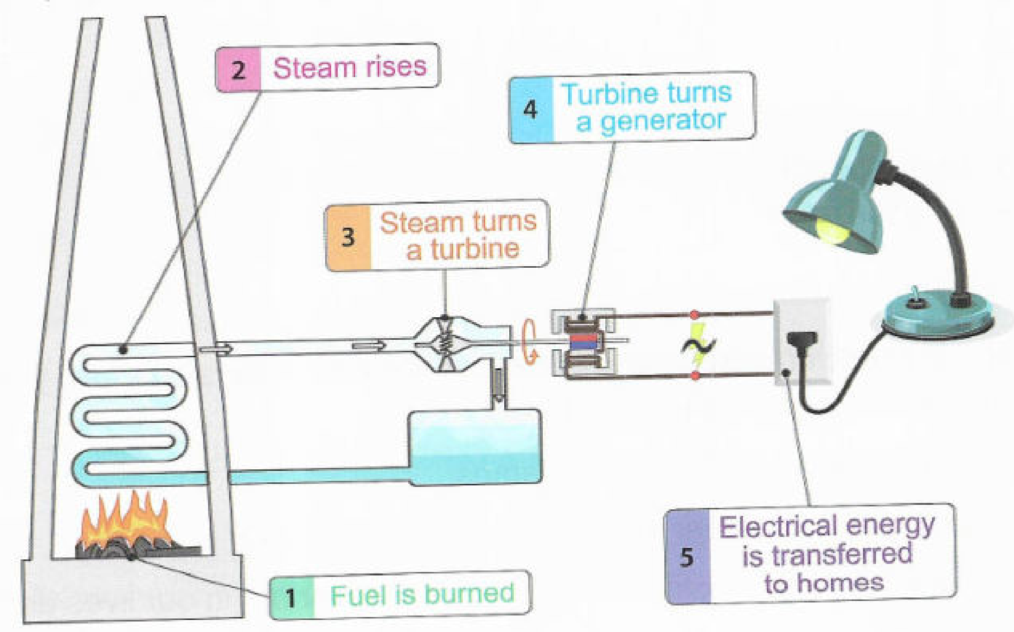
hydropower	القوى المائية	candle	شمعة	imagine	تخيل
appliances	أجهزة	unplug	يفصل	lamps	مصابيح

Activity 8 Using Fossil Fuels to Generate Electricity

- **As you knew from the previous lessons that fossil fuels have many uses such as :**
  - Using gasoline and natural gas to operate cars.
  - Using oil, coal and natural gas to generate electricity.
- **Now**, we will study how fossil fuel can be used to generate electricity, which is used to light homes.

How fossil fuel is used to produce electricity :

To generate electricity, fossil fuel is burned in the electric power station (power plant) as shown in the following steps :



1 Fuel is burned

When fuel is burned, it produces thermal energy.

2 Steam rises

This thermal energy is used to heat water to make steam.

3 Steam turns a turbine

The steam is directed through pipes and used to turn a device called "**turbine**".

power plant	محطة توليد الكهرباء	turbine	توربين	pipe	أنبوبة
steam	بخار	rise	يرتفع		

4 Turbine turns a generator

- The movement of the turbine produces kinetic energy, which is used to operate a generator.
- When the generator is turned on, it converts the **kinetic energy** into **electrical energy**.

5 Electrical energy is transferred to homes

Finally, the electrical energy travels through wires to homes to operate different devices.



Check your understanding

▶ Complete the following sentences :

1. When fossil fuel is burned, it produces .... energy.
2. In the electric power stations, the thermal energy that is produced from burning fossil fuel is used to heat water to form ....
3. In the electric power stations, there is a device known as .... that is used to convert the kinetic energy into electrical energy.

In the Assessment Book :
Try to answer :
Self-Assessment (7)

transfer يَنقل generator مُولد wires أسلاك

Exercises on Lesson 3

● Understand ● Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. Remains of living organisms that were buried under the Earth's surface are affected by .... to form fossil fuels.
   a. low pressure and high temperature
   b. high pressure and low temperature
   c. low pressure and low temperature
   d. high pressure and high temperature
2. All the following factors play an important role in the formation of fossil fuels, except ....
   a. extreme pressure.
   b. extreme heat.
   c. strong wind.
   d. rocks and sediment.
3. All forms of fossil fuel are formed .... *(Behira 2023)*
   a. above the Earth's surface.
   b. under the Earth's surface.
   c. above the water surface.
   d. in the air around us.
4. All the following are forms of fossil fuels, except .... *(Minia 2023)*
   a. water. b. coal. c. natural gas. d. oil.
5. The steps of forming fossil fuel don't include .... of the remains of the living organisms.
   a. decaying b. cooling c. burying d. heating
6. We can use the energy that is produced from .... to generate electrical energy.
   a. renewable resources only
   b. nonrenewable resources only
   c. renewable and nonrenewable resources
   d. food including fruits and vegetables
7. All the following actions don't conserve electrical energy, except ....
   a. unplugging unused electrical appliances.
   b. plugging many unused electrical appliances.
   c. turning on all the house lights all the day long.
   d. leaving the television turned on all the day long.
8. All the following can be used to generate electrical energy, except ....
   a. oil. b. natural gas. c. water. d. glass.
9. Inside the electric power station, heating of .... produces steam.
   a. turbines b. generators c. water d. fuel

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Rocks and sediments 2. Water 3. Oil	a. is a liquid fossil fuel, that is used to produce electricity. b. is a liquid biofuel, that is used to produce thermal energy in houses. c. is a liquid in electric power station that produces steam on heating which turns turbines. d. play an important role in the formation of fossil fuel.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. Any form of fossil fuels must be formed under the Earth's surface. ( )
2. Oil, natural gas and coal can be used to produce electrical energy. ( )
3. Turning off lights that we do not need is a way to conserve electricity. ( )
4. Burning of fossil fuel inside electric power station produces kinetic energy. ( )
5. The movement of a generator in an electric power station produces potential energy. *(Giza 2023)* ( )
6. We have to conserve all forms of fuel. *(Cairo 2023)* ( )

4 Correct the underlined words :

1. Fossil fuels include oil, coal and <u>wood</u>. *(Qena 2023)* (......................)
2. After death of living organisms, their remains are buried under the Earth's surface and exposed to extreme pressure and <u>cool</u>. (......................)
3. Water is a <u>nonrenewable</u> energy resource. (......................)
4. In an electric power station, steam turns turbines that produce <u>thermal energy</u>. (......................)
5. The movement of generator in the electric power station changes kinetic energy into <u>potential</u> energy. (......................)

5 Write the scientific term of each of the following :

1. The type of fuel that is used inside the electric power station to produce electricity. (......................)
2. The device in the electric power station, that produces kinetic energy to operate generators. (......................)

3. The matter that produces steam on heating, which is used to turn turbines in electric power station. (.....................)
4. The device in the electric power station, that converts kinetic energy into electrical energy. (.....................)

6 Complete the following sentences :

1. In electric power station, we use fossil fuels such as oil and natural gas which are considered as .... resources of energy.
2. Water is considered as .... resource of energy, and we can use it to generate ....
3. When fuel is burned in an electric power station, it produces .... energy to heat water.
4. Generators in electric power stations change .... energy into .... energy.
5. During generating electricity in electric power stations, the hot water produces .... which is used to turn turbines.
6. Turbines in electric power stations are turned by steam to produce .... energy required to operate the .... of the electric power stations.
7. Inside electric power stations, the burning of fuel produces .... energy, while the movement of turbines produces .... energy.

7 Give reasons for :

1. Generators are important in electric power stations.

....

....

2. We must turn off lights that we do not need. *(Menofia 2023)*

....

....

8 What happens to ...?

1. A generator that is connected to a damaged turbine in an electric power station.

....

....

2. The movement of the turbine if the water in an electric power station is not heated.

....

9 Look at the opposite picture, then choose the correct answer according to your studying of how electric power stations work :

1. To generate electricity inside electric power station, we need to .... the fuel.
   a. cool
   b. mix water with
   c. burn
   d. mix sand with

Electric power station

2. Steam in electric power station is produced as a result of ....
   a. heating water.
   b. mixing water with fuel.
   c. cooling water.
   d. cooling fuel.
3. On generating electricity inside electric power stations, ... is the first type of energy which is produced from burning of fuel.
   a. electrical energy
   b. thermal energy
   c. potential energy
   d. kinetic energy
4. The generator in electric power station changes .... energy into .... energy.
   a. electrical – kinetic
   b. electrical – thermal
   c. thermal – electrical
   d. kinetic – electrical
5. The movement of turbines produces .... energy.
   a. kinetic
   b. potential
   c. chemical
   d. hydropower

10 Put (✓) in front of sentences which describe conservation of electricity :

1. Turn off lights you do not need. ( )
2. Let electrical devices work all the time. ( )
3. Use energy-saving light bulbs. ( )
4. Leave television turned on all the day long. ( )

11 Arrange the following steps to show how electricity is generated in electric power station and sent it to houses and factories :

(........) Steam turns the turbine that produces kinetic energy.
(........) Fuel is burned and produces thermal energy.
(........) Electrical energy is sent to houses and factories.
(........) Water becomes hot and produces steam.
(........) Turbine turns the generator that produces electrical energy.

LESSON FOUR

Activity 9 Big City Environmental Problems

▶ **Put (✓) in front of the picture that shows environmental pollution :**







In this activity, we will study that fossil fuels have negative impacts in big cities, where the increase of people's needs and their industrial and agricultural activities cause pollution problems around the world.

Some causes of pollution in big cities



1. Smog produced from burning of fuels pollutes the air.



2. Pesticides used in farms can be carried into water in canals and rivers when rain falls, this leads to pollution of soil and water.



3. Chemicals used in many factories pollute the air and also the nearby water and soil.

Some effects (impacts) of air pollution on human's health :

1. Smog from cars causes irritation of human's eyes and lungs.
2. Scientists have found that smog is full of small particles that the human breathes in, these particles irritate the lungs, causing the damage of tissues of the respiratory system.



Check your understanding

▶ **Complete the following sentences :**

1. Smog from cars causes irritation of human's .... and ....
2. Burning fuel produces ...., which pollutes the ....

concerns	مخاوف / مشكلات	canal	قناة	industrial	صناعية	chemicals	مواد كيميائية
impact	تأثير	irritation	تهيج	agricultural	زراعية	particles	جسيمات
smog	الضباب الدخاني	damage	تلف	pesticides	مبيدات حشرية	tissues	أنسجة

Activity 10 Burning Fossil Fuels and Pollution

- You have learned that burning fossil fuels to generate electrical energy pollutes the environment.
- People need energy to operate trains, cars, ships and even more energy is needed to supply houses, schools and factories with electricity.
- To get this energy, people use fossil fuels, where :



- Coal, oil or natural gas are burned in electric power stations and the energy produced from burning fuel is used to generate electricity.
- Then, the generated electricity is transferred to different places through electric wires.

Harms of burning fossil fuels on the environment :



Although burning fuel is used to generate electricity, but it makes pollution, where burning coal and oil produces **carbon dioxide gas** which causes :

1 Acid rain	2 Global warming
Carbon dioxide gas can combine with water in the air to form acid rain that leads to : - The death of trees. - The change in the chemical nature of lakes and kill fish. - The change in the chemical nature of soil. - Dissolving some rocks including the rocks used for building.	Increasing the amount of carbon dioxide gas in the air forms a layer in the atmosphere that traps heat on Earth causing a slow rise in the Earth's temperature, which is known as global warming.

harm	ضرر	trap	يحبس	atmosphere	الغلاف الجوى
change	تغيير	acid rain	أمطار حمضية	global warming	الاحتباس الحرارى
lakes	بحيرات	chemical nature	الطبيعة الكيميائية	dissolve	يذوب
building	البناء				

How to reduce acid rain and global warming :

The best solution to reduce acid rain and global warming is to conserve energy, where:

As we reduce our usage of energy, the amount of burning fossil fuel to generate energy decreases.

↓

As the amount of burning fossil fuel decreases, the amount of carbon dioxide and other pollutants in the air, which we breathe in, will decrease.



Note

Conserving energy not only reduces pollution but also conserves nonrenewable fossil fuels and keeps the Earth clean.



Check your understanding

▶ "Fossil fuels cause air and water pollution".
Based on this statement, complete the following sentences using the words below :

(temperature – lakes – atmosphere – carbon dioxide – rocks – acid)

The burning of fossil fuel causes		Effect
Increasing of .... gas that forms a layer in the	→	Climate change such as increasing the Earth's ....
Carbon dioxide gas combines with water in the air to form .... rain.	→	Change in the chemical nature of .... and dissolving of ....

solution	حل	decrease	يقل
usage	استخدام	pollutants	ملوثات

Activity 11 Conserving Fossil Fuels

▶ **You have learned that how fossil fuels are burned to generate electricity that lights our houses, so we should conserve this type of fuel, where:**

- Fossil fuels are formed over millions of years, this means that fossil fuels cannot be replaced as quickly as we use them.
- There is a limited amount of fossil fuels available on the Earth.
- Fossil fuels will run out from the Earth, if we don't reduce using fossil fuels.

Some ways to conserve fossil fuels



1. Walking or using bicycles instead of driving a car.



2. Turning off the lights when you are not in the room.



3. Replacing fossil fuels with renewable energy resources such as : water, wind and solar energy.

Disadvantages of using fossil fuels to produce energy :

- **When some forms of fossil fuels are burned, they release gases that cause :**
  - Air pollution.
  - Trap heat in the atmosphere causing "global warming" which raises the temperature of Earth and changes its climate.



Note

Using renewable energy resources instead of fossil fuels means that our energy resources will not run out, so this will not cause an increase in Earth's temperature but it costs more money to produce energy from renewable resources than from fossil fuels.

Check your understanding

In the Assessment Book :
Try to answer :
Self-Assessment (8)

▶ Put (✓) or (x) :

1. The amount of fossil fuel on Earth is unlimited. ( )
2. Producing energy from renewable resources costs less money than producing energy from fossil fuels. ( )
3. Using cars instead of bicycles is a way to conserve fossil fuels. ( )
4. The gases released from burning fossil fuels pollute the environment. ( )

limited	محدود	cost	يكلف	climate	مناخ
disadvantages	مساوئ	available	متاح	unlimited	غير محدود

Exercises on Lesson 4

● Understand ● Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. Air pollution is usually caused due to .... of fuel.
   a. cooling b. warming c. freezing d. burning

2. To decrease the pollution in a city to its lowest limit, we have to build a factory ....
   a. that uses oil, inside the city.
   b. that uses coal, inside the city.
   c. that uses natural gas, outside the city.
   d. that uses fossil fuel, inside the city.

3. Smog causes irritation of .... of humans.
   a. stomach and eyes
   b. eyes and lungs
   c. small intestine
   d. large intestine

4. Smog contains tiny particles that ....
   a. damage the human respiratory system.
   b. damage the human digestive system.
   c. help the human body grow up.
   d. keep the human body healthy.

5. Acid rain is formed when .... combines with rain water.
   a. oxygen gas
   b. carbon dioxide gas
   c. dust
   d. sand

6. All the following are harmful effects of acid rain, except ....
   a. global warming.
   b. death of trees.
   c. change in the chemical nature of lakes.
   d. change in the chemical nature of the soil.

7. To reduce pollution with smog, we have to operate cars by ....
   a. gasoline. b. charcoal. c. electricity. d. coal.

8. We must .... fossil fuel at first, to obtain energy.
   a. wash b. cook c. cool d. burn

9. Fossil fuels need .... to be formed under the Earth's surface.
   a. five years
   b. ten years
   c. hundreds of years
   d. millions of years

10. To conserve fossil fuels, we have to do all the following actions, except ....
    a. replacing gasoline with natural gas.
    b. replacing gasoline with solar energy.
    c. replacing natural gas with solar energy.
    d. replacing coal with wind energy.

(Cairo 2023)

11. Burning fossil fuel produces gases that ....
   a. help human to respire.
   b. help animals survive.
   c. pollute the air.
   d. benfit the environment.

12. All the following energy resources cause increasing the temperature of the Earth, except ....
   a. solar energy.
   b. coal.
   c. oil.
   d. wood.

13. All the following sentences are related to the global warming, except ....
   a. changing the Earth's climate.
   b. trapping heat in the atmosphere.
   c. decreasing the Earth's temperature.
   d. increasing the Earth's temperature.

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Acid rain.	a. it is a liquid that is considered as renewable resource of energy.
2. Carbon dioxide gas.	b. it is a gas that is necessary for respiration of living organisms.
3. Water.	c. it is a gas that causes trapping heat on Earth when it increases in air.
	d. it is formed when carbon dioxide gas combines with water in the air.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. Smog doesn't cause any damage in the human respiratory system. ( ) *(Alex. 2023)*
2. Acid rain causes soil and water pollution. ( )
3. Global warming can dissolve some rocks. ( )
4. The heat trapped on Earth causes global warming. ( )
5. Acid rain helps trees to survive. ( )
6. To reduce pollution and conserve nonrenewable resources of energy, we must decrease their use. ( )
7. When burning fossil fuels increases, the temperature on Earth decreases. ( )
8. As a result of global warming, the temperature on the Earth increases. ( )
9. To conserve fossil fuels, we have to replace them with renewable resources of energy. ( )
10. Global warming is one of the bad effects of using fossil fuels to produce energy. ( )

4 Correct the underlined words :

1. The amount of renewable resources of energy are limited on Earth. (....................)
2. The amount of biofuels cannot be replaced as quickly as it is used. (....................)
3. Gases released from burning fossil fuels always clear the air. (....................)
4. Wood is considered a nonrenewable resource of energy. (....................)
5. Nonrenewable resources of energy will not run out as they are used. (....................)
6. Wood is a fossil fuel that is used in warming houses. *(Qena 2023)* (....................)
7. Gases released from fossil fuels on burning decrease the temperature on Earth. (....................)
8. Renewable energy resources are natural materials that are consumed at a faster rate than they can be renewed. (....................)

5 Write the scientific term of each of the following :

1. It is a phenomenon in which the Earth's temperature increases, when carbon dioxide gas increases in the air. (....................)
2. It is a system in the human body that is damaged due to breathing a big amount of smog. (....................)
3. It is a type of rain that is formed when carbon dioxide gas combines with water in the air. (....................)
4. The type of fuels that when burned, it produces gases which pollute the air. (....................)
5. The increase of the temperature on the Earth, as a result of burning fossil fuels. (....................)

6 Complete the following sentences :

1. When pesticides mix with water in canals, this causes the pollution of .... and ....
2. Factories may cause pollution of .... , ... and .... due to the chemicals they use. *(Cairo 2023)*
3. Smog leads to .... pollution that causes irritation of .... and .... of humans.
4. Tiny particles found in .... lead to air pollution that causes damage of tissues of the human .... system.
5. Burning coal and oil produces .... gas, which combines with .... in air forming acid ....
6. Increasing the burning of fossil fuel produces more .... gas that causes .... pollution.

7. Acid rain leads to change in the chemical nature of lakes causing death of ....
8. Burning coal and oil produces .... gas which forms a layer in the atmosphere causing rise in the Earth's temperature in a phenomenon known as ....
9. The change in the chemical nature of .... due to .... rain may lead to the death of trees.
10. To conserve fossil fuels, we can replace them with renewable resources of energy such as water , ... and ....
11. Global warming causes the raise of .... on Earth and changes its .... *(Giza 2023)*
12. When fossil fuel is burned, it releases .... that cause air pollution and trap .... in atmosphere.
13. If people do not conserve using of .... fuels, they will run out on Earth.
14. Using the .... resources of energy costs more money than using fossil fuels.
15. To avoid air pollution, we must use .... resources of energy such as .... , solar energy and .... energy.

7 Give reasons for :

1. Smog of cars is very dangerous to human health.
....
....
2. Farmers must decrease the use of pesticides.
....
....
3. Increase the burning of fossil fuel causes acid rain.
....
....
4. Global warming occurs due to the increase of burning coal and oil.
....
....
5. Acid rain has a bad effect on buildings in cities.
....
6. Fossil fuels cannot be replaced as quickly as they are used.
....
....
7. To keep the air clean, we must replace fossil fuels with renewable resources of energy.
....
....

8 What happens ...?

1. If pesticides mix with water of canals and rivers.

....

2. If factories decrease their use of chemicals.

....

3. If acid rain falls on buildings for a long period of time.

....

4. If people decrease burning fossil fuels.

....

5. To the amount of fossil fuels if people don't conserve their usage.

....

....

6. To the Earth's temperature if we use renewable resources of energy instead of fossil fuels.

....

....

9 Look at the following graph that describes the percentage of smog in four different cities during one month, then choose the correct answer :

Percentage of smog

City	Percentage of smog
City ①	20
City ②	10
City ③	40
City ④	30

Cities

1. People in city number .... have the highest percentage of eyes' diseases.
   a. ① b. ② c. ③ d. ④

2. City number .... has the least percentage of air pollution.
   a. ① b. ② c. ③ d. ④

3. City number .... is the most one that needs to change the type of fuel to decrease the air pollution in it.
   a. ① b. ② c. ③ d. ④

4. People suffer from respiratory system diseases in city number .... are less than those in city number ①.
   a. ① b. ② c. ③ d. ④

10 The different forms of fossil fuels are considered as resources of energy on Earth that have some disadvantages.

Choose the correct answer :

1. If we don't conserve using fossil fuels, their amount will ....
   a. not change on the Earth.
   b. increase on the Earth.
   c. be constant on the Earth.
   d. run out on the Earth.

2. To conserve fossil fuels, we must do all the following actions, except ....
   a. using energy-saving light bulbs.
   b. using fossil fuels more than solar energy.
   c. using bikes more than cars.
   d. using renewable resources of energy more than fossil fuels.

3. Fossil fuels are characterized by all the following, except ....
   a. they have limited amount.
   b. they produce thermal energy on burning.
   c. they are renewable resources of energy.
   d. they are nonrenewable resources of energy.

4. All the following resources are considered nonrenewable resources of energy, except ....
   a. charcoal.
   b. natural gas.
   c. coal.
   d. oil.

LESSON FIVE

Activity 12 Using Fuels

▶ **Put (✓) or (✗) :**

1. Fossil fuel is used in cooking food. ( )
2. Fossil fuel is used in generating electricity to light houses. ( )

▶ **In the previous lessons, you have learned about types of fuels, their forms and their uses, and you also have learned that different forms of fuels can be classified as renewable or nonrenewable energy resources.**

• The following table shows the renewable energy resources and nonrenewable energy resources :

Renewable energy resources	Nonrenewable energy resources
Solar energy	Coal
Water	Gasoline
Charcoal (is made from wood)	Oil
Wind energy	Natural gas
Wood	

Check your understanding

▶ **Choose the correct answer :**

1. Water is considered as a .... energy resource. (renewable – nonrenewable)
2. Charcoal is made from .... (oil – wood)
3. Coal is considered as a .... energy resource. (renewable – nonrenewable)
4. .... is considered as a renewable energy resource. (Gasoline – Wind energy)

Activity 13 Record Evidence Like A Scientist

▶ **In this concept, you have learned a lot about some types of fuels, their forms and their uses.**

- **Now,** try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learned in the previous concepts.

Step 1 The Question

Where does the fuel we use every day come from ?

Step 2 My Claim

....

....

....

Step 3 My Evidence

....

....

Step 4 My Scientific Explanation

....

....

....

Review on Concept (3.2)

To review this concept look at the **Assessment Book** "Part 2 : Final Revision".

In the Assessment Book :

Try to answer :
- Self-Assessment (9)
- Model Exam on Concepts (3.1) & (3.2)

claim	فرضية	evidence	دليل
scientific explanation	تفسير علمي		

Exercises on Lesson 5

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. Both coal and charcoal ....
   a. are renewable resources of energy.
   b. are nonrenewable resources of energy.
   c. are examples of biofuel.
   d. produce thermal energy on burning.
2. All the following resources are considered renewable resources of energy, except ....
   a. water.
   b. wind energy.
   c. gasoline.
   d. solar energy.
3. Among the following resources, we must conserve ....
   a. solar energy and coal.
   b. solar energy and wind energy.
   c. wind energy and oil.
   d. oil and coal. *(Alex. 2023)*

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Wood. 2. Coal. 3. Wind energy.	a. it is a renewable resource of energy that doesn't pollute the air. b. it is a biofuel that is used in warming houses. c. it is a biofuel that is produced from corn. d. it is a fossil fuel that pollutes the air when it is burned.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. The amount of oil on the Earth is limited. ( )
2. Fossil fuels that human made from corn can be replaced as quickly as it is used. *(Cairo 2023)* ( )
3. The use of fossil fuels to produce energy costs more money than using renewable resources. *(Giza 2023)* ( )
4. Wind energy will run out faster than natural gas. ( )

4 Give one example for each of the following :

1. A renewable resource of energy : ....
2. A nonrenewable resource of energy : ....
3. A method of conserving fossil fuels : ....
4. A disadvantage of using fossil fuels to produce energy : ....
....
5. An advantage of using renewable resources to produce energy :
....

Model Exam 

on Concept (3.2)

Total mark

15

1 (A) Correct the underlined words : *(5 marks)*

1. Fuel is the matter that produces electrical energy on burning. (..........................)
2. Wood is a form of fossil fuels that can be used in houses. (..........................)
3. The amount of all types of biofuels cannot be replaced as quickly as it is used. (..........................)
4. Gases released from burning fossil fuels always clear the air. (..........................)

(B) What happens to ... ?

The Earth's temperature if we use renewable resources of energy instead of fossil fuels.

....

....

2 (A) Choose the correct answer : *(5 marks)*

1. Coal is formed under the Earth's surface from the remains of ....
   a. dead animals. b. dead plants.
   c. dead humans. d. dead insects.
2. Among the following resources, we must conserve ....
   a. solar energy and coal. b. solar energy and wind energy.
   c. wind energy and oil. d. oil and coal.
3. All the following are found deeply under the Earth's surface, except ....
   a. natural gas. b. coal.
   c. green plants. d. oil.
4. All the following are used to generate electrical energy, except ....
   a. oil. b. natural gas.
   c. water. d. glass.

(B) Give a reason for the following :

Cutting trees to obtain wood has negative effects on the environment.

....

....

3 (A) Complete the following sentences : *(5 marks)*

1. Some forms of fuel can be used in cooking such as wood, ... and ....
2. The generator in the electric power station changes .... energy into .... energy.
3. Using the .... resources of energy costs more money than using fossil fuels.
4. Different forms of fuel can be classified into two main types which are .... and ....

(B) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Water 2. Wind energy 3. Coal	a. it needs extreme heat and pressure to be formed from remains of dead plants. b. it is the main resource of energy on the Earth's surface. c. it is a gaseous renewable resource of energy. d. it is a liquid renewable resource of energy.

1. .... 2. .... 3. ....

Model Exam 2

on Concept (3.2)

Total mark

15

1 **(A) Choose the correct answer :** *(5 marks)*

1. Ancient people used .... as a fuel before discovering gasoline.
   a. electricity b. water c. wind d. wood
2. All the following are forms of fossil fuels, except ....
   a. water. b. coal. c. natural gas. d. oil.
3. Acid rain is formed when .... combines with rain water.
   a. oxygen gas b. carbon dioxide gas c. dust d. sand
4. We must .... fossil fuel at first, to obtain energy.
   a. wash b. cook c. cool d. burn

(B) Give a reason for the following :

Generators are important in electric power stations.

....

2 **(A) Write the scientific term of each of the following :** *(5 marks)*

1. The main source of most forms of energy on the Earth's surface. (....................)
2. It is a liquid form of fossil fuel that was formed from dead marine animals. (....................)
3. The energy resources that include wind energy, water and solar energy. (....................)
4. The device in the electric power station, that converts kinetic energy into electrical energy. (....................)

(B) What happens to ... ?

The amount of fossil fuels if people don't conserve their usage.

....

3 **(A) Put (✓) or (✗) :** *(5 marks)*

1. Wind energy will run out faster than natural gas. (   )
2. Turning off lights that we do not need is a way to conserve electricity. (   )
3. We can make liquid biofuel from wood chips and grass. (   )
4. As the speed of the car increases, the amount of used fuel decreases. (   )

(B) Cross out the odd word :

Oil – Coal – Charcoal – Natural gas. (....................)

Concept

3.3 Renewable Energy Resources





Learning outcomes

By the end of this concept, your child will be able to :

- Apply scientific ideas to design, test and refine devices that convert energy from one form to another.
- Explain the use of renewable energy resources in the generation of electricity.
- Develop models based on observations and evidence that energy is transferred from place to place.

Key vocabulary

- Heat
- Turbine
- Light
- Watermills
- Radiation
- Windmills
- Solar energy

Notes For Parents On Concept [3.3]

Lessons	Activities	What you should do with your child
1	Activity 1	Explain to your child the different ways for generating electricity using renewable energy resources.
	Activity 2	Discuss with your child the differences and similarities between windmills and watermills.
	Activity 3	Discuss with your child about the uses of solar energy.
2	Activity 4	Discuss with your child the importance and uses of solar panels.
	Activity 5	Explain to your child how wind energy can be used to generate electricity.
3	Activity 6	Discuss with your child how the energy of running water can be used to generate electricity.
	Activity 7	Let your child do a model of water turbine and to know the meaning of water cycle.
4	Activity 8	Help your child to think like a scientist by answering a question about one of the main points of this concept, then write his/her claim, evidence and the scientific explanation.

LESSON ONE

Activity 1 Can You Explain ?



In the previous concept, you have learned that the renewable energy means that it does not run out faster than we use.

▶ What are the different ways we can use renewable energy to generate electricity?

- From the previous pictures, we notice some examples of renewable energy resources which are solar energy (sunlight), wind and water.
- Generating electricity by using the previous renewable energy resources in different ways, where :
  - Solar panels generate electricity by using the solar energy, which is used to operate light posts in streets.
  - Wind turbines generate electricity by using the kinetic energy of wind.
  - Water turbines generate electricity by using the kinetic energy of water.

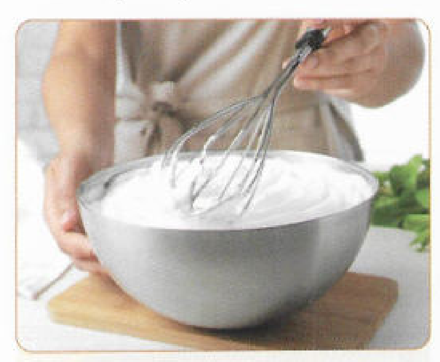
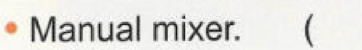
▶ In this concept, we will study :

- Windmills and watermills.
- Renewable energy resources.
- The Sun and the use of solar energy.
- Ways to generate useful energy using the wind movement.
- Ways to generate electricity using the kinetic energy of water.

windmills	طواحين هوائية	watermills	طواحين مائية	movement	حركة
wind turbines	توربينات الهواء	water turbines	توربينات المياه	solar panels	الألواح الشمسية

Activity 2 Windmills and Watermills

▶ **Put (✓) in front of the device that generates electricity :**

• Manual mixer. ( )



• Water turbines. ( )



• Wind turbines. ( )

- You know that most of the devices around us require electricity to be powered, but how did humans powered machines hundreds of years ago before electricity ?

Windmills and watermills :

- Hundreds of years ago, people needed machines to make their lives easier, for example, they used windmills and watermills which helped them to crush (grind) grain to make flour.
- **The following table shows the advantages, disadvantages and energy used in windmills and watermills :**

Points of comparison	Windmills	Watermills
Energy used :	The wind movement generates kinetic energy which moves the mills' blades, then kinetic energy transfers to other parts of the mills to crush the grain.	The water movement generates kinetic energy which moves the mills' blades, then kinetic energy transfers to other parts of the mills to crush the grain.
Advantages :	• Low cost. • Renewable energy resource.	• Low cost. • Renewable energy resource.
Disadvantages :	Sometimes the wind does not blow, so the windmills do not move, so they are unable to do their job.	Sometimes the water source may dry up, so the watermills do not move, so they are unable to do their job.

devices	أجهزة	power	يشغل	blades	الشفرات	advantages	مزايا
crush	يطحن	grain	حبوب	dry up	يجف	disadvantages	عيوب
blow	تهب	machines	الآلات	flour	طحين/دقيق		

Old mills and modern turbines :



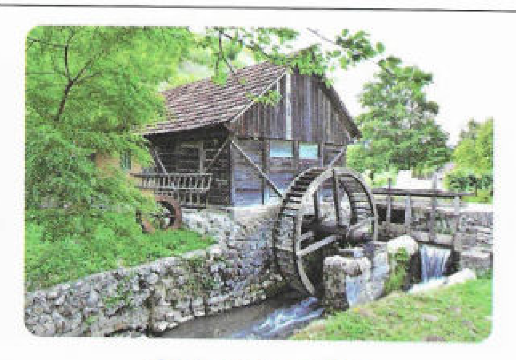
Old windmills

- They use wind as an energy resource.
- They have openings in their blades.
- They have more blades than those of the modern wind turbines.
- They are shorter than the modern wind turbines.
- They are used in crushing grain.



Modern wind turbines

- They use wind as an energy resource.
- They don't have openings in their blades.
- They have fewer blades than those of the old windmills.
- They are taller than the old windmills.
- They are used in generating electricity.



Old watermills

- They use the movement of water as an energy resource.
- They are used in crushing grain.



Modern water turbines

- They use the movement of water as an energy resource.
- They are used in generating electricity.



Check your understanding

Put (✓) or (✗) :

1. All mills depend on the kinetic energy of wind only in order to be operated. (   )
2. From the advantages of windmills and watermills is that they are low cost. (   )
3. The kinetic energy of water is responsible for the movement of windmills. (   )

openings فتحات modern حديث

Activity 3 Using Energy From the Sun

- The Sun is the main source of energy on Earth as it provides us with light and heat.
- Living organisms need the Sun to survive.
- In this activity we are going to know how the energy of the Sun reaches us on Earth and how we use it in our daily life.
- At night when the Sun is not visible in the sky, you can feel warm because :
  - The atmosphere absorbs the energy of the Sun.
  - The land and water on Earth's surface absorb the energy of the Sun, which causes increasing in the Earth's temperature.

Solar energy :

- The energy coming from the Sun is called "solar energy", which contains light and thermal energies from the Sun.
- The solar energy that is produced by the Sun contains a type of energy called "radiant energy" or "radiation" which is found in the sun rays.

Uses of solar energy :

Direct source of thermal energy

Solar energy can be used directly as a source of thermal energy when exposing yourself to the sun rays to feel warm.



Warming houses

Houses can be built in a way that enables the energy of the Sun to warm them by placing large windows on the walls that face the Sun for most of the day.



Greenhouses

- Greenhouses are used to plant the crops that only grow in warm climate.
- Greenhouses allow the entry of solar energy (especially radiant energy), then this radiant energy is converted into thermal energy that warms the inside of the greenhouses.



Greenhouse

absorb	يمتص	warming	تدفئة	greenhouse	صوبة زراعية
exposing	تعريض	enables	يمكن	crops	محاصيل
visible	مرئي	radiation	اشعاع		

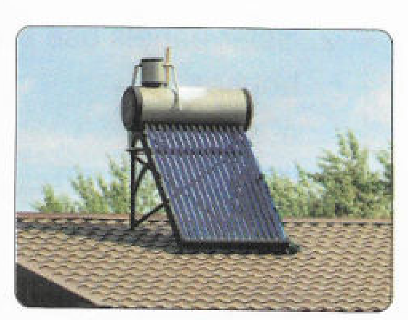
Cooking food

- Where, convergent mirrors (concave mirrors) are used to collect and focus sunlight (sun rays) to heat metal pots and cook the food inside.
- Convergent (concave) mirrors are curved mirrors as shown in the opposite picture.



Solar water heater

- It consists of panels made of black pipes can be placed on the roof of houses.
- It is used to heat the water when it passes through these pipes, then the heated water is stored in a water tank to be used later.



Solar water heater

Check your understanding

▶ **Complete the following energy chains :**

.... energy (From the Sun) → Converted into → .... energy (In greenhouses)

.... energy (From the Sun) → Converted into → .... energy (In solar panels) → Converted into → .... energy (In lighting lamps)

In the Assessment Book :
Try to answer :
Self-Assessment (10)

convergent mirrors	مرايا مجمعة	roof	سطح	pipes	أنابيب
metal pots	أواني معدنية	tank	خزان	curved mirrors	مرايا منحنية
concave mirrors	مرايا مقعرة				

Exercises on Lesson 1

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. All of the following are examples of renewable energy resources, except ....
   a. fossil fuel. b. waterfalls. c. wind. d. sunlight.
   (Cairo 2023)

2. Solar panels use solar energy to generate .... energy which is used in lighting houses.
   a. sound b. electrical c. potential d. kinetic

3. The wind movement has .... energy which moves the windmill's blades.
   a. kinetic b. solar c. thermal d. potential

4. Both modern wind turbines and modern water turbines are similar in their ....
   a. shape.
   b. ability to generate electrical energy.
   c. blades number.
   d. ability to generate potential energy.

5. In the absence of sunlight, all the following items will be negatively affected, except ....
   a. plants. b. human. c. rocks. d. animals.

6. Solar water heater changes .... energy into .... energy.
   a. electrical – thermal
   b. solar – sound
   c. electrical – sound
   d. solar – thermal

7. The two forms of energy that transfer from the Sun to the Earth in the form of waves are .... energy and .... energy.
   a. electrical – light
   b. sound – thermal
   c. thermal – chemical
   d. light – thermal

8. When land and water areas on Earth absorb the solar energy, the .... on Earth increases.
   a. temperature b. rocks c. water d. ice

9. The solar energy is converted into .... energy in greenhouses. *(Cairo 2023)*
   a. electrical b. sound c. thermal d. potential

10. Greenhouses allow farmers to plant crops that only grow in ....
    a. polar climate.
    b. warm climate.
    c. absence of sunlight.
    d. absence of water.

11. Using convergent .... sheets in cooking food is one of the benefits of using the solar energy.
    a. paper b. plastic c. mirror d. wooden

2 Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Solar water heater 2. Light energy and thermal energy 3. Kinetic energy	a. the energy that is used by wind turbines. b. use the energy of the Sun to heat water in homes. c. are the two main forms of energy produced from the Sun. d. is the form of energy produced from solar panels.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. Wind turbines generate electricity by using the energy of water flow. ( )
2. Machines make our lives more easier. ( )
3. The low cost of the energy used in watermills is from the disadvantages of using this energy. ( )
4. Windmills always do their job all the time, because the wind never stop blowing. *(Behira 2023)* ( )
5. Both wind movement and water flow have kinetic energy. ( )
6. Both modern wind turbines and old windmills are used to generate electricity. ( )
7. All devices require energy to do their functions. ( )
8. The modern wind turbines have more blades than that of the old windmills. ( )
9. The Sun is the main source of energy on Earth. *(Cairo 2023)* ( )
10. Living organisms don't need the Sun to survive. ( )
11. The Sun provides the Earth with light and heat. *(Behira 2023)* ( )
12. Solar water heater is formed of panels made of black pipes. ( )
13. Placing large windows on the walls that face the Sun helps in warming houses. ( )

4 Correct the underlined words :

1. Solar panels use sound energy to generate electricity. (.....................)
2. Water turbines generate electricity by using the energy of wind movement. (.....................)
3. Manual mixer depends on electricity to do its function. (.....................)
4. The high cost of producing energy in windmills is one of its advantages. (.....................)
5. In the absence of the light of moon, living organisms cannot survive. (.....................)
6. Thermal energy and sound energy are produced from the Sun and reach the Earth. (.....................)

5 Write the scientific term of each of the following :

1. A mill that is turned by water flow. *(Minia 2023)* (....................)
2. A mill that is operated by wind movement. *(Menofia 2023)* (....................)
3. The type of energy that is produced from wind turbines to operate different home devices. *(Ismailia 2023)* (....................)
4. An equipment that is used to convert the kinetic energy of wind into electrical energy. (....................)
5. A type of mirrors that is used to collect and focus sunlight onto metal pots to heat them and cook the food inside. (....................)
6. They help farmers in cold regions to plant crops which grow only in warm climate. *(Qalyoubia 2023)* (....................)
7. An equipment consists of panels made of black pipes that is used to heat water at houses. (....................)

6 Complete the following sentences :

1. In electric power stations, the burning coal produces .... energy to generate electricity, while wind turbines generate electricity by using the .... energy of wind.
2. The water flow has kinetic energy, which moves the .... of water turbines to transform this energy into .... energy.
3. Both .... and .... are used to crush grain hundreds of years ago.
4. Although modern wind turbines and old windmills vary in shape, they all use .... energy to be powered.
5. Both wind and water movement produce .... energy that is used to rotate turbines to generate .... energy. *(Cairo 2023)*
6. The solar energy is produced from the .... , and the .... energy is a type of this energy which is carried by sun rays.
7. When we expose our bodies to the Sun, we feel ....
8. We can use solar energy in cooking by using .... which collect and focus .... onto metal pots to heat them.
9. Greenhouses convert the radiant energy of the sun rays into .... energy that allows farmers to plant crops which grow in .... climates.

7 Give reasons for :

1. Humans used windmills and watermills from hundreds of years ago.
....
2. Sometimes the Sun is not visible in the sky but you can feel its warmth.
....

8 What happens if ...?

1. Wind doesn't blow in an area that contains many modern wind turbines.

....

....

2. Sunlight falls on solar panels.

....

....

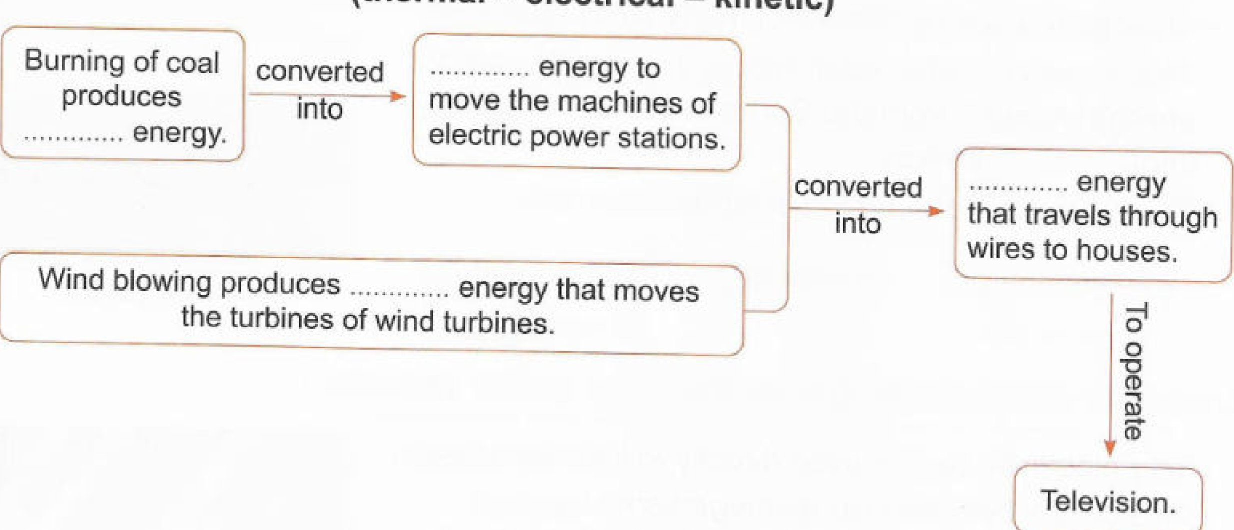
3. Sunlight falls on a greenhouse.

....

....

9 Complete the following energy chain by using the energies below : (You may use each word more than once).

(thermal – electrical – kinetic)



10 Put (✓) in front of the pictures in which solar energy can be used :



Bell | Hand mixer | Greenhouse | Solar water heater

LESSON TWO

Activity 4 Solar Energy

▶ **Put (✓) or (✗) :**

1. The Sun gives us warmth and light. ( )
2. The main source of energy on Earth is the moon. ( )

- You already know the source and uses of solar energy.
- **Now,** we will study how solar panels convert solar energy coming from the Sun into electricity.

Solar panels :

Solar panels can be very small that they can supply only one light bulb with energy, or very large that they can supply buildings or cities with energy.

▶ **How do solar panels work?**

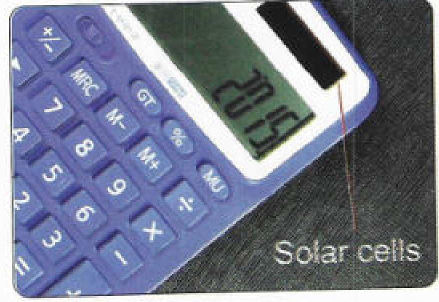
- Solar panels are composed of many small solar cells.
- These cells capture solar energy (especially radiant energy) coming from the Sun and convert it directly into electrical energy.
- Solar panels are used to generate electricity.


Solar panels

Radiant energy (From the Sun) → Converted into → Electrical energy (In solar panels)

Uses of electricity generated by solar panels :

- This electricity can be used directly to light the streets.
- This electricity is used to recharge some types of batteries, like some calculators with small solar cells.
- This electricity is used in houses to operate various electric devices.
- This electricity is used to operate irrigation equipment in some villages.



Calculator with small solar cells



Check your understanding

▶ In the table below, classify the following energies in the solar panel system into input and output energy :

(Solar energy – Electrical energy)

Input energy	Output energy
....	....

composed	يتكون	various	مختلف	villages	قرى
irrigation	ري	capture	يلتقط	solar cells	الخلايا الشمسية

Activity 5 Harness the Wind

You have learned about the renewable energy resources such as the Sun, water and wind. **Now,** let's know how wind turbines convert kinetic energy of the wind into electricity.

Using energy of the wind :

Different amounts of solar energy (especially radiant energy) reach different regions of the world.



Radiant energy heats up the air around the Earth to different degrees, where the difference in temperatures between cold air and hot air causes air to move and wind to blow.



- Kinetic energy of the wind movement is used to rotate (spin) the blades of wind turbines.
- When the blades of wind turbines rotate, this causes the rotation of turbines and that leads to generating electrical energy.



This electrical energy is transmitted through big wires to different places such as houses and factories.



▶ The following diagram shows the energy chain of the wind turbines :

Radiant energy (From the Sun) → Converted into → Thermal energy (causing temperatures vary between hot air and cold air) → Converted into → Kinetic energy (In wind turbines) → Converted into → Electrical energy (In power lines)

transmitted	يُنقل	harness	تسخير	spin	يدور
degrees	درجات	wires	اسلاك	vary	تتغير



Note

In wind turbines, when the kinetic energy of wind increases, the blades rotate faster, so the efficiency of wind turbines increases.

Check your understanding

▶ Put (✓) or (×):

1. Kinetic energy of the wind is converted into electrical energy by wind turbines. ( )
2. Wind is a nonrenewable energy resource. ( )
3. The difference in air temperatures around the Earth causes air to move and wind to blow. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (11)

efficiency كفاءة

Exercises on Lesson 2

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. All the following are from the uses of electricity generated by solar panels except ....
   a. operating windmills. b. operating irrigation equipment.
   c. lighting streets. d. operating calculators.
2. All the following are renewable energy resources, except ....
   a. waterfalls. b. coal. c. the Sun. d. wind.
3. Kinetic energy of .... movement is used to rotate the blades of wind turbines.
   a. the moon b. stars c. water d. wind
4. When the blades of wind turbines rotate, this causes their turbines to rotate that leads to generating .... energy. *(Alex. 2023)*
   a. electrical b. solar c. chemical d. potential
5. The electrical energy is transmitted from wind turbines to houses through ....
   a. water. b. wind. c. coal. d. wires.
6. The electrical energy that is transmitted to houses can operate all the following devices, except ....
   a. washing machine. b. manual mixer.
   c. electric fan. d. electric heater.
7. The change of energy in an .... is opposite to the change of energy in a wind turbine.
   a. electric bell b. electric heater c. electric iron d. electric fan
8. When .... energy of wind increases, the blades of wind turbines spin more quickly.
   a. kinetic b. potential c. chemical d. solar

2 Put (✓) or (✗) :

1. A solar panel consists of one small solar cell. ( )
2. Wind is a renewable energy resource. *(Qalyobia 2023)* ( )
3. There is a similarity in temperatures between cold and hot air. ( )
4. In wind turbines, the kinetic energy is converted into chemical energy. ( ) *(Cairo 2023)*
5. Electricity generated by wind turbines is transmitted through wind. ( )
6. When air blows into the wind turbine weakly, the blades spin slowly. ( )

3 Correct the underlined words :

1. Small solar panels are used to supply one light bulb with <u>sound</u> energy. (....................)
2. <u>Potential</u> energy of the wind is converted into electrical energy by wind turbines. (....................)
3. The difference in temperatures between cold and hot air causes air to <u>stop</u>. (....................)
4. <u>Water</u> turbines rotate when their blades rotate as wind blows. (....................)
5. When air blows into the wind turbine strongly, the blades spin <u>slower</u>. (....................)

4 Write the scientific term of each of the following :

1. A panel designed to absorb the energy of the Sun to generate electricity. *(Qalyoubia 2023)* (....................)
2. A natural movement of air that is resulted from the difference in temperatures between cold air and hot air. (....................)
3. A turbine that uses the power of flowing air to generate electricity. (....................) *(Giza 2023)*
4. An energy that is generated from wind turbines and is transmitted through wires to houses and factories. (....................)

5 Complete the following sentences :

1. Solar cells that convert radiant energy coming from the sun rays into .... energy.
2. Solar cells that are found in some calculators produce .... energy that is used to recharge their ....
3. In some villages, solar panels are used to generate .... energy that is used to operate .... equipment.
4. Wind is formed due to the effect of .... energy coming from the .... in the form of rays.
5. Wind blows due to the difference in .... between the cold air and the hot air.
6. The rotation of blades of wind turbines is caused by .... energy that is created by wind movement.
7. When wind turbines rotate, ... energy is converted into .... energy.
8. When wind blows into a wind turbine with a large force, its blades rotate .... than that when wind blows into it with a small force.
9. By increasing the rotation of wind turbine blades, the wind turbine generates more .... energy. *(Alex. 2023)*
10. When the .... energy of wind increases, the speed of rotation of turbine blades will .... *(Giza 2023)*

6 Give reasons for :

1. Some electrical devices have solar panels which are composed of many solar cells.

   ....

2. Kinetic energy of wind affects the speed of wind turbine blades rotation.

   ....

   ....

3. Sometimes the wind turbines are useless.

   ....

   ....

7 What happens if ...?

1. The solar cells in a calculator are exposed to sunlight.

   ....

2. The kinetic energy of a wind that is applied on the wind turbine increases.

   ....

   ....

3. There is difference in temperatures of air around Earth.

   ....

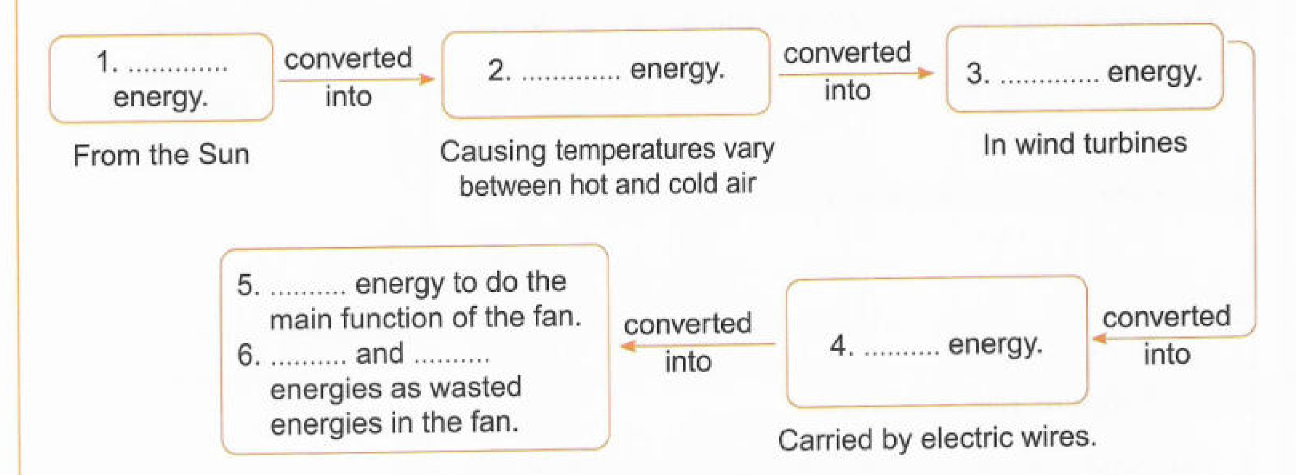
   ....

8 Complete the following table :

	Used energy	Produced energy
1. Solar panels	.... energy	.... energy
2. Wind turbines	Kinetic energy	.... energy

9 **Complete the following energy chain of a fan using the words between brackets : (You may use the same word more than once).**

(Thermal – Radiant – Electrical – Kinetic – Sound)



LESSON THREE

Activity 6 Falling Water

▶ **Put (✓) or (✗) :**

1. Water is considered as a renewable energy resource. (   )
2. The flow of water can be used in generating electricity. (   )

- You have known that wind can be used to generate electricity.
- **Now,** we will study how water can be used to generate electricity.

Falling water :

- Rivers flow downhill, and during this process the gravitational potential energy of water is converted into kinetic energy that helps water turbines rotate to generate electricity.
- Dams are built on rivers to control the water flow and increase the potential energy of water.
- There is a type of dams called hydroelectric dam which is used to generate electricity using the flow of water.

▶ **How can electricity be generated from hydroelectric dams using water turbines ?**

1. A hydroelectric dam prevents the flow of river water, so the potential energy of water increases.
2. When water is released, it flows through water turbines in the dam and the potential energy of water is converted into kinetic energy.
3. The kinetic energy of flowing water transfer to water turbines so turbines rotate that operate generators to generate electricity.
4. This electricity is sent through long electric wires to the places where it is needed, and this type of electricity is called "hydroelectric energy" or "hydroelectricity".

Hydroelectric dam

Hydroelectric energy (hydroelectricity):

It is a type of electrical energy generated by water turbines in dams.

downhill	انحدار	dams	سدود	hydroelectric	كهرومائى		
prevent	يمنع	gravitational	جاذبية	water flow	تدفق المياه		

The following table shows the similarities and differences between the use of water and the use of wind to generate electricity :

The use of water to generate electricity	The use of wind to generate electricity
Differences	
It is used in places where dams are built on rivers.	It is used in places with strong winds.
Similarities	
- Both of them are renewable energy resources. - Both of them use kinetic energy to operate turbines to generate electricity.	



Check your understanding

▶ Complete the following sentences using the words below :

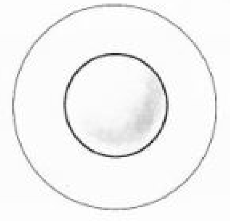
(wind turbines – water turbines – hydroelectric energy)

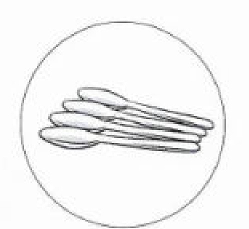
1. Water flows through .... in dams to generate electricity.
2. The electrical energy generated by water turbines in dams is known as ....
3. In places with strong winds, ... are used to generate electricity.

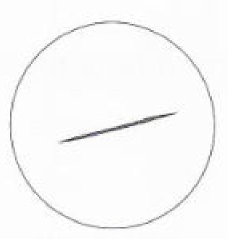
Activity 7 Modeling a Turbine Generator

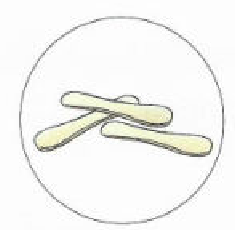
- You have learned how the energy of water movement is used to generate hydroelectric energy.
- **Now,** you will design a model of a water turbine.

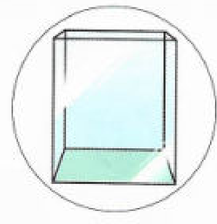
Tools


Ball of white cork


4 plastic spoons


Toothpick


3 wooden sticks

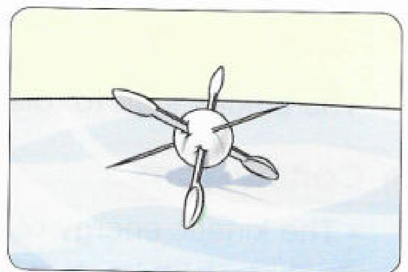

Bowl


Jug

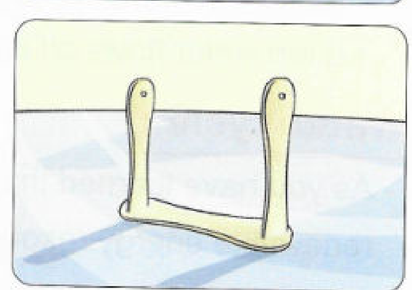

Wax gun

Steps

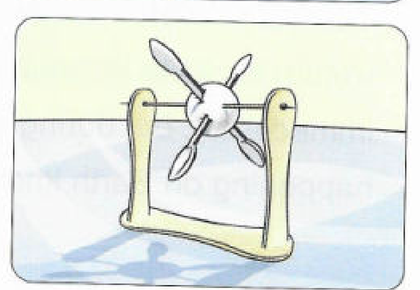
1. Make the blades of the water turbine using the ball of cork, four plastic spoons and the toothpick as shown in the opposite figure.



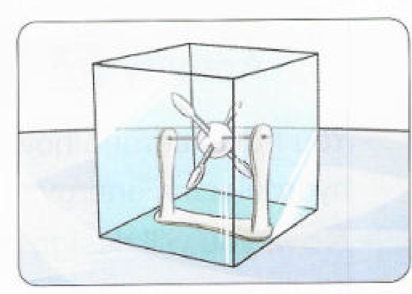
2. Make the base of water turbine by using the three wooden sticks and the wax gun as shown in the opposite figure.



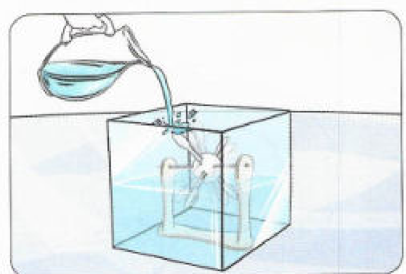
3. Fix the blades to the base as shown in the opposite figure.



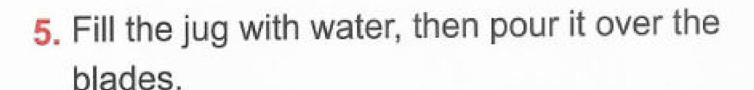
model	نموذج	bowl	وعاء	cork	فلين
jug	إبريق	toothpick	عود أسنان	wax gun	مسدس شمع
fix	يثبت	base	قاعدة		



4. Place the turbine inside the bowl.

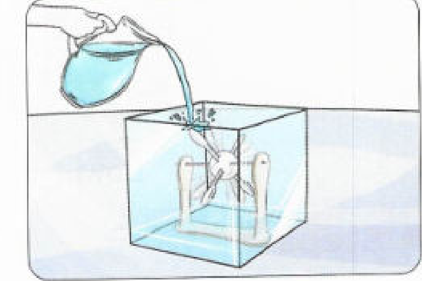


5. Fill the jug with water, then pour it over the blades.



Observation

The blades rotate when water is poured over them and stop when the water inside the jug is completely run out.



6. When the water in the jug runs out, refill it with water from the bowl and pour water over the blades again.

Observation

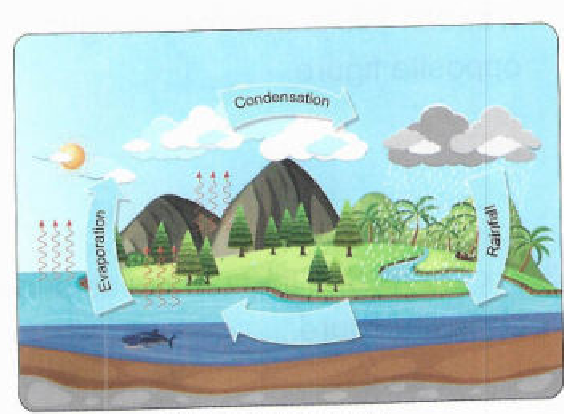
The blades start to rotate again.

Conclusions

- The kinetic energy of moving water in rivers is used to rotate water turbines to generate hydroelectric energy.
- If the water flows all the time, the water turbines will be operated all the time.

Water cycle :

- As you have learned that the water is renewable energy resource.
- The river's water doesn't renewed (return back) to its source through the dam immediately, but during a process which is happening on Earth known as "water cycle".



The water cycle

pour	يصب	refill	اعادة تعبئة
water cycle	دورة المياة	source	مصدر

Where :

- The river's water flows into other bodies of water and evaporates (water changes into water vapor), then condenses (water vapor changes into water) forming clouds.
- When rain falls from these clouds, the water returns again to the river.



Check your understanding

▶ **Put (✓) or (✗) :**

1. Water is a nonrenewable resource that is used to generate hydroelectric energy. ( )
2. In the water turbine, kinetic energy is converted into hydroelectric energy. ( )

Review on Concept (3.3)

To review this concept look at the **Assessment Book** "Part 2 : Final Revision".

In the Assessment Book :

Try to answer :
- Self-Assessment (12)
- Model Exam on Theme (3)
- Questions of the school book on Theme (3)

condense	يتكثف	water vapor	بخار الماء	return	يعود
evaporate	يتبخر	clouds	سحاب		

Exercises on Lesson 3

● Understand ● Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. Water flows through turbines in hydroelectric dams to generate .... energy.
   a. electrical b. potential c. solar d. light *(Giza 2023)*

2. In water turbines, the .... energy of water is changed into electrical energy.
   a. chemical b. kinetic c. thermal d. light *(Qalyoubia 2023)*

3. The reason of flowing of river water downhill is the .... force.
   a. pushing b. friction c. gravitational d. electrical

4. Using of water to generate electricity depends on places ....
   a. with strong winds.
   b. where dams are built on rivers.
   c. with weak winds.
   d. where boats sail in rivers.

5. Both waterfalls and .... are renewable energy resources.
   a. wind b. coal c. oil d. fossil fuel

6. The water behind a dam stores .... energy.
   a. kinetic b. thermal c. potential d. electrical

7. Both water and wind use .... energy to operate turbines.
   a. kinetic b. thermal c. electrical d. solar

8. The form of energy resulted from waterfalls is called .... energy. *(Qena 2023)*
   a. thermal b. chemical c. solar d. hydroelectric

9. Which of the following is a renewable energy resource ? ....
   a. Running bicycle.
   b. Running car.
   c. Running water.
   d. Running person.

10. In the water cycle, water .... , then it .... before falling in the form of rains.
    a. freezes – evaporates
    b. evaporates – condenses
    c. evaporates – freezes
    d. condenses – evaporates

11. River water evaporates by the help of heat produced from ....
    a. kettles.
    b. the Sun.
    c. electric heaters.
    d. electric iron.

12. In the water cycle, the water evaporates, then it condenses in form of .... and returns back through rain falling.
    a. clouds b. sand c. rocks d. coal

13. If the speed of moving water changes from 5 m/sec to .... m/sec, its kinetic energy will increase.
    a. 2 b. 3 c. 4 d. 6

2 Put (✓) or (X) :

1. Waterfalls are considered as nonrenewable energy resources. *(Dakahlia 2023)* (   )
2. Electrical energy can be generated from both waterfalls and wind movement. (   ) *(Cairo 2023)*
3. Dams are built on rivers to control the wind flow. (   )
4. The flow of water can be controlled to generate electricity in dams. (   ) *(Cairo 2023)*
5. When river flows downhill, its gravitational potential energy converted into chemical energy. (   )
6. Running water in rivers has kinetic energy. (   )
7. The energy produced by wind turbines is known as hydroelectric energy. (   )
8. The evaporated water from rivers can return back to rivers through the water cycle. (   )
9. Water is from nonrenewable energy resource as it evaporates. (   )

3 Correct the underlined words :

1. The <u>thermal</u> energy generated by water turbines in dams is known as hydroelectricity. (......................)
2. During the flowing of rivers water downhill, the <u>chemical</u> potential energy of water is converted into kinetic energy. (......................)
3. Dams are built on rivers in order to generate <u>solar</u> energy. (......................) *(Minia 2023)*
4. The electrical energy is generated by <u>wind</u> turbines in dams. (......................)

4 Write the scientific term of each of the following :

1. A turbine that converts the energy of falling water into electrical energy. (......................)
2. A type of electrical energy generated by water turbines in dams. (......................)
3. A type of dams that is used to generate electricity using the flow of water. (......................)
4. A turbine in which the kinetic energy of moving water is used to generate hydroelectric energy. *(Cairo 2023)* (......................)
5. A process in which water changes into water vapor. (......................)

6. The process in which the water of rivers evaporates, then condenses forming clouds and return back to rivers through rainfalls. (....................)
7. A process in which water vapor changes into water forming clouds. (....................)

5 Complete the following sentences :

1. When rivers flow downhill, ... energy of water is converted into .... energy that rotates water turbine.
2. People build .... on rivers to control the water flow and increase its .... energy that is converted into .... energy in water turbines that is used to light houses.
3. Dams control the flow of .... that causes the increase of the .... energy of water.
4. The type of electrical energy which is produced by water turbines is called ....
5. Water and .... are from the renewable resources of energy which use .... energy to operate turbines and generate ....
6. We can use a device known as wind .... to generate electricity in places where strong air blows.
7. Water turbines are used to generate electricity in places which have waterfalls or ...., while wind turbines are used in places with strong ....
8. Hydroelectricity is generated by using water .... in dams.
9. Renewable energy resources include .... , ... and .... *(Behira 2023)*
10. The movement of water in river is used to rotate water .... to generate electricity.
11. Both wind and water movement produce .... energy that is used to rotate turbines to generate .... energy.
12. Clouds are formed due to the ...., then .... of water of rivers and seas.
13. In water turbines, the .... energy of water movement is converted into a type of electrical energy which is called .... energy. *(Cairo 2023)*

6 Give reasons for :

1. Hydroelectric dams are built on rivers.

....

....

2. Water turbines are placed in waterfalls areas.

....

....

3. Some dams contain water turbines.

....

....

7 What happens if ...?

1. Water turbines are placed in a dam.

....

....

2. Potential energy of water increases behind a dam that has water turbines.

....

3. Water of seas and rivers evaporates, then condenses in the atmospheric air.

....

8 Complete the following energy chain of a television by using the words between brackets :

(Electrical – Sound – Thermal – Potential – Light – Kinetic)

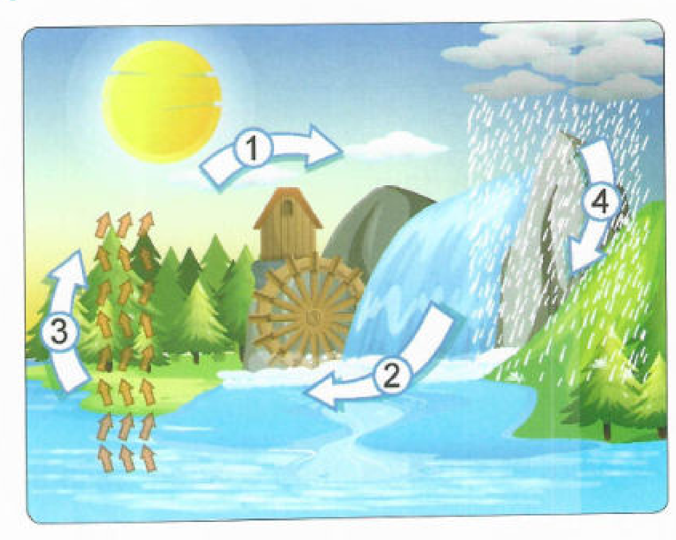
1. .... energy. of water behind dams → converted into → 2. .... energy. that causes water turbine moves → converted into → 3. .... energy. that travels through wires → converted into →

4. .... and .... energies that do the main function of television.
5. .... energy as a wasted energy in the television.

9 Complete the following table :

Points of comparison	Wind turbines	Water turbines
Energy used :	.... energy of wind.	.... energy of water.
Type of used energy :	Renewable energy.	.... energy.
Produced energy :	.... energy.	.... energy.

10 Look at the following figure that represents the water cycle, then complete the sentences below :



1. The arrow number (..........) represents the evaporation of river's water.
2. The arrow number (..........) represents the condensation of water vapor to form clouds.
3. The arrow number (..........) represents the falling of rain that make water return back to the river.
4. The arrow number (..........) represents the water movement in waterfall that makes the watermill rotate.

LESSON FOUR

Activity 8 Record Evidence Like a Scientist

- In this concept, you have learnt a lot about renewable and nonrenewable energy resources and the benefits of using renewable energy resources.

- **Now,** try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learnt in the previous concepts.

Step 1 The Question

What are the different ways we can use renewable energy to generate electricity ?

Step 2 My Claim

....

....

....

Step 3 My Evidence

....

....

....

Step 4 My Scientific Explanation

....

....

....

....

evidence دليل claim افتراض space الفضاء

Model Exam 

on Concept (3.3)

Total mark

15

1 **(A) Write the scientific term of each of the following :** *(5 marks)*

1. The main energy which is produced from generators that are connected to both water turbines and wind turbines. (........................)
2. The main source of energy on Earth. (........................)
3. A turbine that uses the power of blowing air to generate electricity. (........................)
4. An equipment consists of panels made of black pipes that is used to heat water at houses. (........................)

(B) Give a reason for the following :

Hydroelectric dams are built on rivers.

....

2 **(A) Correct the underlined words :** *(5 marks)*

1. Thermal energy and <u>sound</u> energy are produced from the Sun and reach the Earth. (........................)
2. When air blows into the wind turbine strongly, the blades spin <u>slower</u>. (........................)
3. Solar panels use <u>sound</u> energy to generate electricity. (........................)
4. During the flowing of river's water downhill, the <u>chemical</u> potential energy of water is converted into kinetic energy. (........................)

(B) What happens if ... ?

The presence of solar panels in some electrical devices.

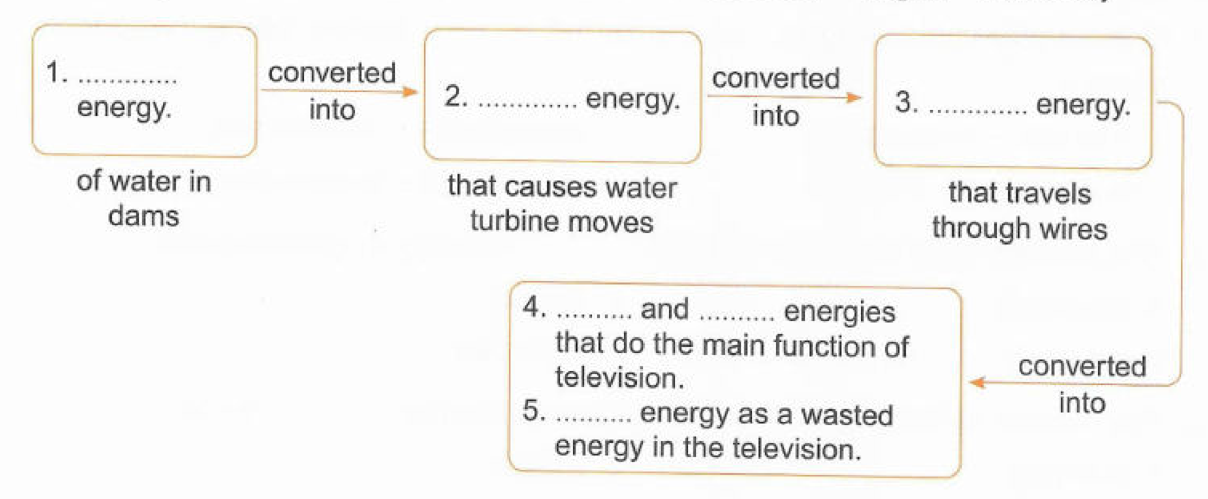
....

3 **(A) Put (✓) or (✗) :** *(5 marks)*

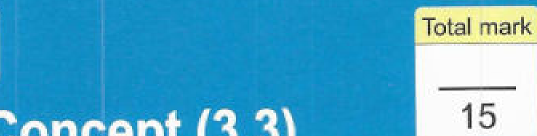
1. Both wind movement and water flow have kinetic energy. (   )
2. The hydroelectric energy is produced by using wind turbines. (   )
3. Wind is a renewable energy resource. (   )
4. The flow of water can't be controlled to generate electricity in dams. (   )

(B) Complete the following energy chain of a television by using the words between brackets :

(Electrical – Sound – Thermal – Potential – Light – Kinetic)



Model Exam 2



Total mark
15

1 (A) Choose the correct answer : *(5 marks)*

1. In the water cycle, water ...., then it .... before falling in the form of rains.
   a. freezes – evaporates
   b. evaporates – condenses
   c. evaporates – freezes
   d. condenses – evaporates

2. The solar energy is converted into .... energy in greenhouses.
   a. electrical
   b. sound
   c. thermal
   d. potential

3. The reason of flowing of river water downhill is the .... force.
   a. pushing
   b. friction
   c. gravitational
   d. electrical

4. Some types of lamps in streets depend directly on .... as a renewable energy resource in order to do its function.
   a. sunlight
   b. petrol
   c. coal
   d. natural gas

(B) Complete the following table :

Device	Used energy	Produced energy
Solar panels	.... (1) .... energy	.... (2) .... energy

2 (A) Write the scientific term of each of the following : *(5 marks)*

1. A turbine in which the kinetic energy of moving water is used to generate electricity. (..........................)
2. A process by which water changes into water vapor. (..........................)
3. A natural movement of air that is resulted from the difference in temperatures between cold air and hot air. (..........................)
4. A glass building that is used in cold areas to plant crops which grow in warm climate. (..........................)

(B) Mention one use for the following :

Windmills : ....

....

3 (A) Put (✓) or (✗) :

(5 marks)

1. Wind turbines must be used in windy places. ( )
2. Solar panels can be used to operate irrigation equipment in some villages. ( )
3. Water condenses forming fuel, then return back to its source during rainfall. ( )
4. Dams are built on rivers to increase thermal energy of rivers' water. ( )

(B) Give a reason for the following :

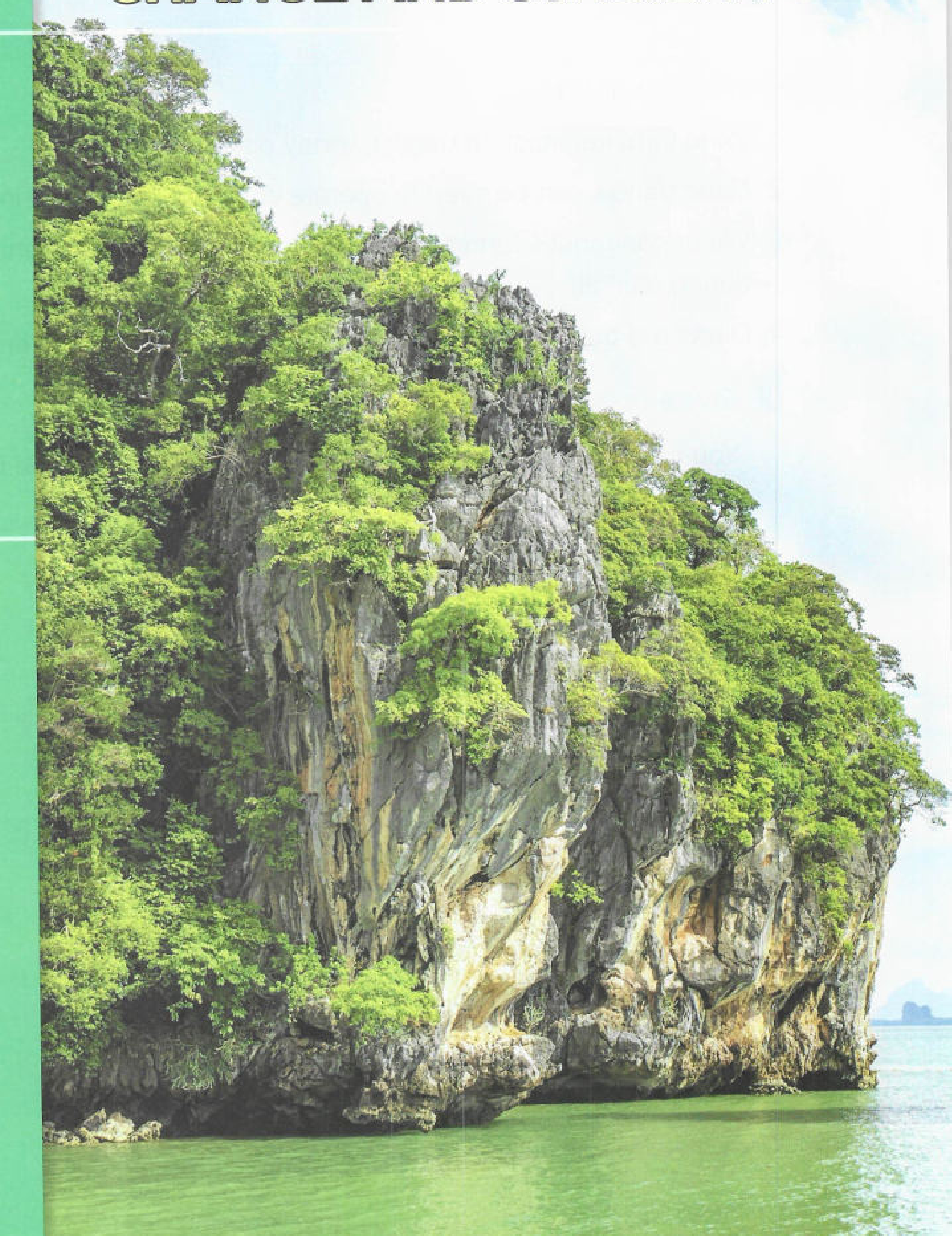
You can feel warm at night although the Sun is not visible in the sky.

....

....

THEME FOUR : CHANGE AND STABILITY

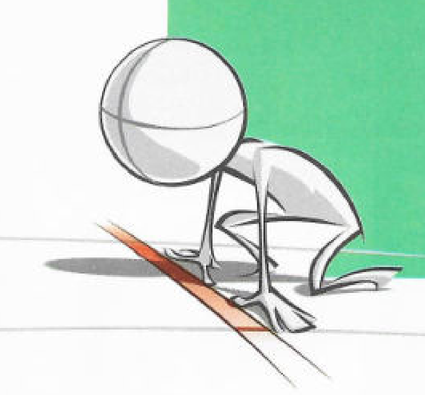
4 UNIT



SHIFTING SURFACES

Get Started

What I Already Know



- **There are many forces such as water and wind that shape the rocks on Earth's surface.**
  - Water and wind can break down rocks and move them from one place to another through two processes known as "weathering" and "erosion".



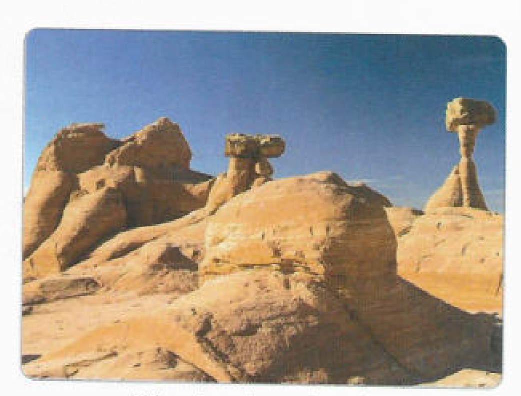
Wadi Nakhr

- **The opposite image shows a large canyon known as Wadi Nakhr in the country of Oman.**
  - In Wadi Nakhr, water, wind and other factors cause the different landforms there such as high peaks and also the cracks in the large rocks.



- **In this unit, you are going to study :**
  - How weathering and erosion shape the Earth's surface.
  - The role of the following factors in weathering process:

- Water.	- Wind.
- Plant roots.	- Acid rain.
- Oxygen gas in air.	



Weathering of rocks

  - How deposition process helps in the formation of different landscapes on the Earth's surface.

- **Unit Project :**

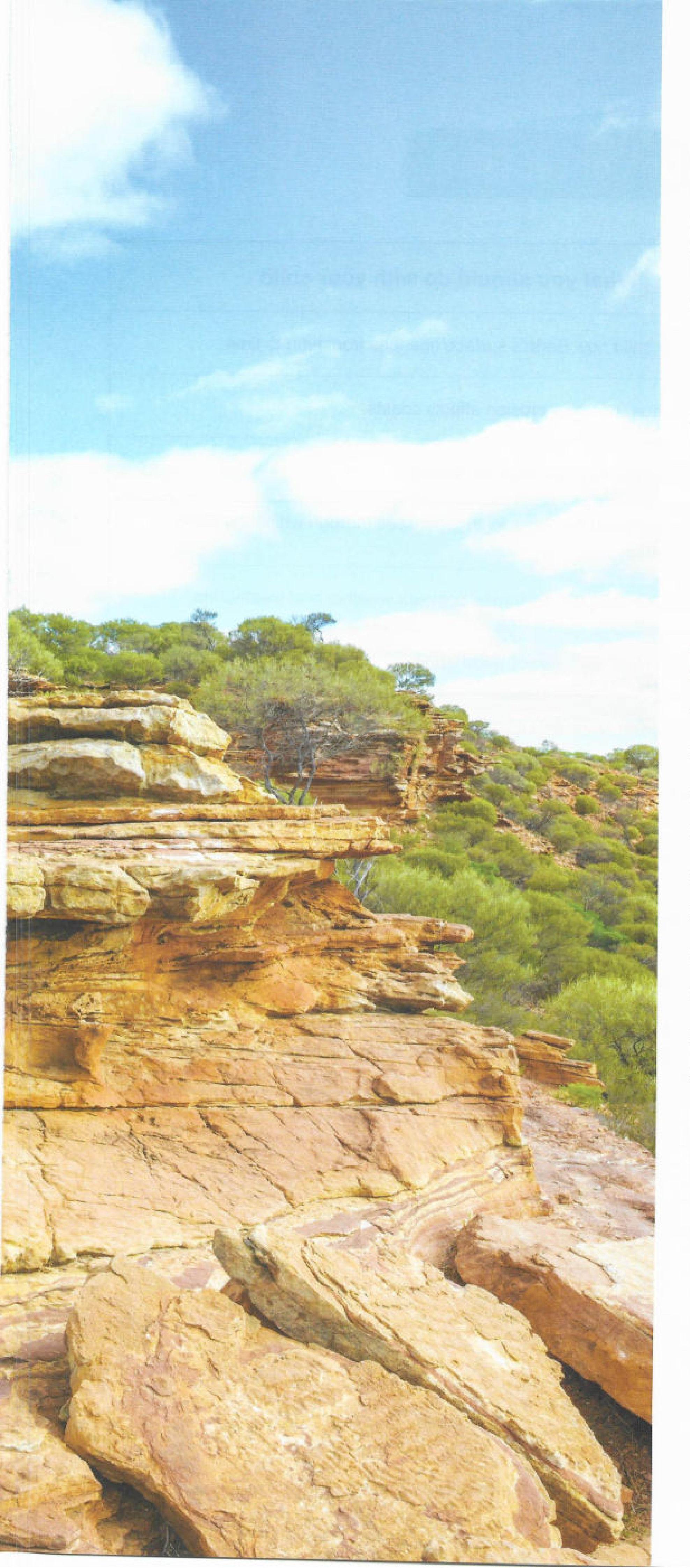
"Forces that shape the Earth" At the end of this unit, you will make a research project to predict what factors (such as erosion, weathering, ... etc.) have an important role in shaping the different landforms of Wadi Nakhr over time.



Wadi Nakhr

Concept 4.1 Breaking Down and Moving Rocks





Learning outcomes

By the end of this concept, your child will be able to :

- Explain the roles of water, wind and heat in weathering, erosion and deposition.
- Provide evidence that mechanical and chemical weathering change Earth's surface over time.

Key vocabulary

- Air
- Chemical weathering
- Deposition
- Erosion
- Heat
- Mechanical weathering
- Sediment
- Soil
- Water
- Weathering

Notes For Parents On Concept (4.1)

Lessons	Activities	What you should do with your child
1	Activity 1	Explain to your child how Earth's surface changes from time to time.
	Activity 2	Discuss with your child how erosion affects coasts.
	Activity 3	Explain to your child how canyons are formed.
2	Activity 4	Discuss with your child the three main processes through which the Earth's surface changes.
	Activity 5	Discuss with your child the difference between weather and weathering.
	Activity 6	Explain to your child the types of weathering.
3	Activity 7	Let your child observe models for different types of weathering.
	Activity 8	Let your child observe some photos that shows weathering.
4	Activity 9	Explain to your child how erosion occurs.
	Activity 10	Explain to your child how deposition changes the shape of the land.
5	Activity 11	Discuss with your child how sand dunes are formed.
	Activity 12	Help your child to think like a scientist by answering a question about one of the main points of this concept then write his/her claim, evidence and the scientific explanation.

LESSON ONE

Activity 1 Can You Explain ?


Picture 1 Broken rocks


Picture 2 Coastal rocks

The pictures above show some changes in the Earth's surface.

▸ What are the factors changing the Earth's surface ?

- The surface of the Earth is always changing due to the effect of the wind, water and weather changes.

Examples :

- As you see in picture 1, wind can break down rocks and can move the small particles of rocks from an area to another.
- As you see in picture 2, water can change the shape of rocks.

▸ In this concept, we will study :

- Changing Earth's surface.
- Rocks and canyons.
- Weathering.
- Types of weathering.
- Causes of weathering.
- Erosion.
- Deposition.

factors	عوامل	canyon	أخدود	erosion	تعرية
break down	تفتت	deposition	ترسيب	weathering	تجوية
landscape	مظاهر السطح	particles	جزيئات	rocks	صخور

Activity 2 Disappearing Sandcastles

▶ **Look at the opposite pictures, then put (✓) or (×) :**

1. The footprints will still be there the next day. ( )



2. The shape of the sandcastle will still be there without changing till the next day. ( )



Natural Erosion :

- If a child built a sandcastle on the beach (seashore), he may notice the disappearance of a part of it or all of it after few hours.
- Water and wind are some of the factors that can transport small rocks from one place to another forming a process known as "erosion".
- The disappearance of the sandcastle (erosion of the sandcastle) is due to the transportation of the sand particles from its place to another by the effect of water and this is considered as an example of natural erosion.

Notes

1. Sand is formed by breaking down of some types of rocks into smaller particles.
2. Forces of water and wind are responsible for the disappearance of sandcastles and erosion of coasts.





Check your understanding

▶ Put (✓) or (✗) :

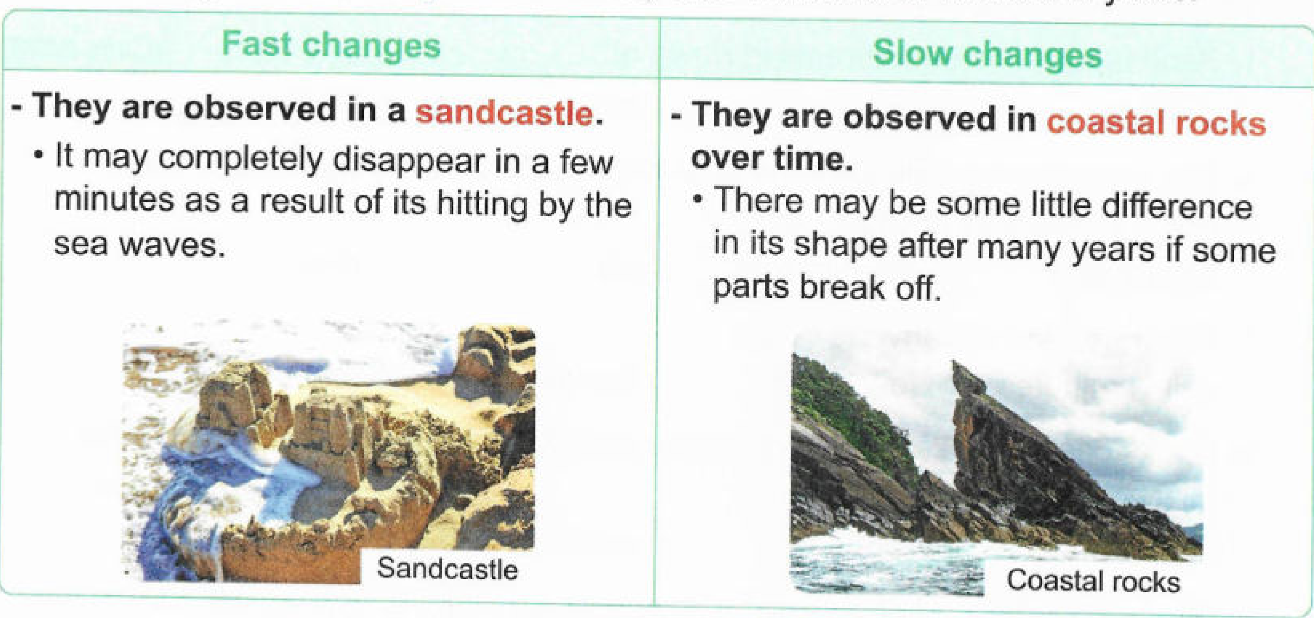
1. The erosion of a sandcastle on a beach is considered as a natural erosion. ( )
2. Rocks are formed by breaking down of sand. ( )

sandcastles	قلاع رملية	notice	يلاحظ	coasts	سواحل
footprints	آثار الأقدام	disappearance	اختفاء	transport	نقل
natural erosion	تعرية طبيعية	responsible for	مسئول عن		

Activity 3 Sandcastles, Rocks and Canyons

▶ The Earth's surface is continuously changing. Some changes can be very fast, other changes can be very slow that may take hundreds or millions of years.

Fast changes	Slow changes
- They are observed in a sandcastle. • It may completely disappear in a few minutes as a result of its hitting by the sea waves.	**- They are observed in coastal rocks over time.** • There may be some little difference in its shape after many years if some parts break off.



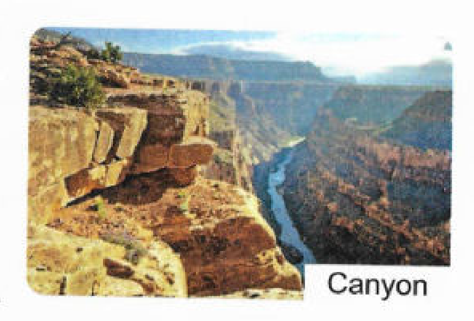
Sandcastle | Coastal rocks

▶ **In the previous pictures, we can observe some similarities between the sandcastle and coastal rocks :**

1. Both have steep needle-like parts.
2. Both have sloping sides (inclined sides) at the bottom.
3. Water and wind create their shapes.

Canyons :

They are deep valleys carved by flowing water.



Canyon

▶ Canyons are formed due to the slow changes that happened to its rocks over many years.

▶ Canyons are formed by the action of water.

▶ A canyon has needle-like parts and slopes at the sides.



Check your understanding

▶ Put (✓) or (✗) :

1. The Earth's surface never change over time. ( )
2. Wind and water can break down rocks into smaller particles. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (13)

hitting	ضرب	coastal rocks	صخور ساحلية	waves	أمواج
inclined sides	جوانب مائلة	break off	تنفصل	valley	وادي
needle-like	تشبه الإبرة	slopes	انحدارات	carved	منحوتة

Exercises on Lesson 1

● Understand ● Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. Sand is formed due to breaking down of .... *(Cairo 2023)*
   a. glass. b. wood. c. rocks. d. plastic.
2. The deep narrow valley with slopes at its sides and often with water stream flowing through it is known as a ....
   a. canyon. b. mountain. c. hill. d. river.
3. The formation of canyons takes .... *(Alex. 2023)*
   a. few minutes. b. few hours. c. few days. d. many years.
4. Rocks can be broken down into small particles by the exposure to all of the following, except .... *(Aswan 2023)*
   a. rain water. b. wind. c. moon. d. water waves.
5. Disappearing a part of a sandcastle due to the effect of sea waves means that all the following have changed, except .... *(Giza 2023)*
   a. its shape. b. its volume. c. its size. d. its color.
6. The force of wind plays an important role in erosion, because it can transfer ....
   a. sound energy. b. light energy.
   c. small sized-particles of sand. d. very large pieces of rocks.
7. Among the changes which are happened very fast, is ....
   a. formation of deep canyons. b. disappearance of a sandcastle.
   c. breaking down of costal rocks. d. breaking down of mountain rocks.

2 Choose from column (B) what suits it from column (A) :

(A)	(B)
1. Costal rocks.	a. are formed by the effect of sunlight directly.
2. Canyons.	b. can be disappeared in few minutes and made of sand particles on seashores.
3. Sandcastle.	c. deep valleys that are carved by flowing of water.
	d. are formed near seas over many years and have needle-like parts and sloping sides.

1. .... 2. .... 3. ....

3 Put (✓) or (✗) :

1. The surface of the Earth changes from time to time. *(Cairo 2023)* ( )
2. Water stream can break down rocks into smaller pieces. ( )
3. When large particles of rocks are broken into smaller particles, they can be carried by the moving wind. ( )
4. If you walk on the seashore and come the next day searching for your footprints, you will find them unchanged. ( )
5. All changes that occur on the Earth' surface take hundreds of years. ( )
6. Water and wind are artificial forces that are responsible for the erosion of sea coasts. ( )
7. The changes that are observed in the formation of a canyon are faster than that observed in the disappearance of a sandcastle. ( )

4 Write the scientific term of each of the following :

1. The disappearance of a sandcastle as a result of its hitting with the sea waves. (....................)
2. They are deep valleys carved by flowing water. (....................)
3. Rocks that are found near seashores and broken by the effect of wind and water over long periods of time. (....................)

5 Complete the following sentences by using the words between brackets :

(slow – erosion – fast – rocks – wind – water)

1. The shape of coastal rocks is affected by the forces of .... and wind. *(Alex. 2023)*
2. The origin of sand is the breaking down of some types of .... *(Suez 2023)*
3. Air moving from an area to another and has a role in breaking down of rocks into smaller particles is known as ....
4. The process of transporting small rocks from one place to another by the help of water or wind is known as .... *(Behira 2023)*
5. Disappearance of a sandcastle is an example of .... changes, while formation of a canyon is an example of .... changes.

6 Give a reason for the following :

Formation of canyons is considered as an example of slow changes.

....

7 What happens if ...?

Sea waves hit costal rocks over a long period of time.

....

....

8 Study the following figures, then choose the correct answers below :


Figure (1)


Figure (2)

1. The force of water forms ....
   - a. figure (1) only.
   - b. figure (2) only.
   - c. figures (1) and (2).
   - d. neither figure (1) nor (2).

2. Water that affects the item in figure (1) is considered as an example of ....
   - a. human-made changes.
   - b. artifical changes.
   - c. fast changes.
   - d. slow changes.

LESSON TWO

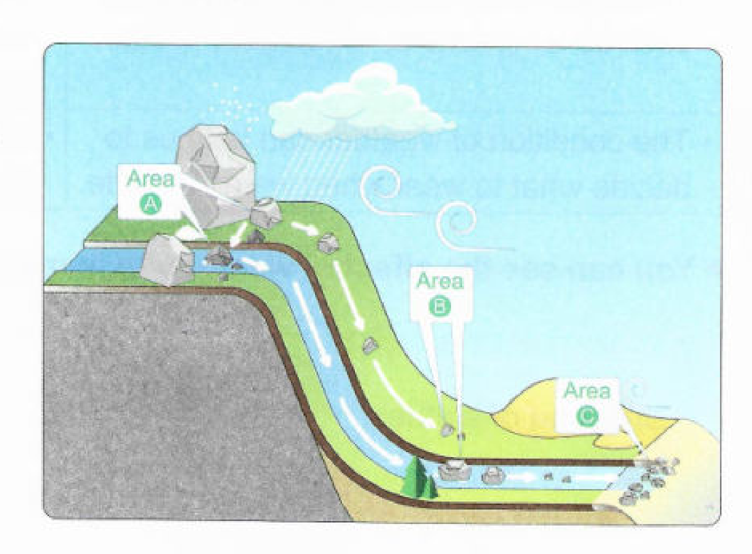
Activity 4 What Do You Already Know About Breaking Down and Moving Rocks ?

▶ **Put (✓) or (×) :**

1. Erosion happens when the rocks get moved away by water or wind. ( )
2. Sometimes erosion can happen very quickly. ( )

Shaping the Earth :

In this activity, we are going to understand some processes through which the Earth's surface changes, these processes include weathering, erosion and deposition that can be shown in the following figure.



▶ From the previous figure we can observe that :

- Area A shows the breaking down of large rocks into small particles (sediments), this process is known as "weathering".
- Area B shows the movement of sediments from one place to another, this process is known as "erosion".
- Area C shows the dropping of sediments in a new place, this process is known as "deposition".

Note

Sediments could be sand, rocks or soil, and this depends on the environment in which the weathering process takes place.

Check your understanding

▶ **Complete the following sentences :**

1. The process that is laying sediments down in a new place called ....
2. The process in which rocks are broken down into smaller particles is known as ....

Activity 5 What is Weathering ?

Weather and weathering :

▶ Weather is different from weathering, where :

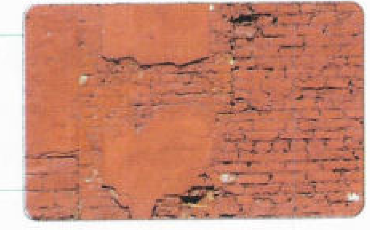
Weather	Weathering
It is the condition of atmosphere at a specific time and place.	It is the breaking down of rocks on Earth's surface into smaller (tiny) pieces.
• There are many factors affecting weather such as temperature, wind, rains, ... ect.	• There are many factors that cause weathering such as temperature, wind and water.
• The condition of weather can help us to decide what to wear when we go outside.	• Weathering can change the shape of Earth's surface over time.

▶ **You can see the effect of weathering in many observations around you such as :**

Breaking of statues.



Removing of paints of buildings.



Pulling a wave to the sand of seashores.





Note

Colder climate and ice are other factors that can change the landscape.



Check your understanding

▶ Put (✓) or (X) :

1. Weather is the breaking down of rocks on Earth's surface into smaller pieces. ( )
2. Weathering process affects the coastal areas. ( )

statues	تماثيل	condition	حالة	seashore	شاطئ البحر	atmosphere	الجو
paints	طلاء	specific	محدد	weather	طقس	pulling	سحب

Activity 6 Types of Weathering

▶ There are two types of weathering which are "Mechanical weathering" and "Chemical weathering".

A. Mechanical weathering :

It is the breaking down of rocks due to the effect of physical factors like wind, water, plant roots and temperature.

1. The role of wind in mechanical weathering :

Wind pushes the sand from a place to another.

↓

Friction occurs between sand and rocks.

↓

Rocks are broken down.



2. The role of water in mechanical weathering :

Flowing water that carries small gravel and sand runs quickly and collide with large rocks.

↓

Large rocks are broken down and its rough edges become smooth.



3. The role of plant roots in mechanical weathering :

Plant roots grow inside the cracks of rocks.

↓

Cracks become wider.

↓

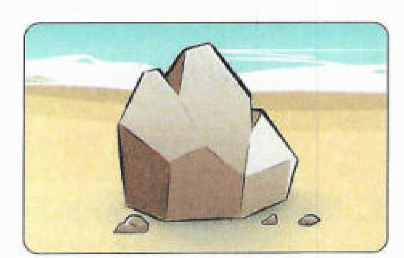
Rocks are broken down.



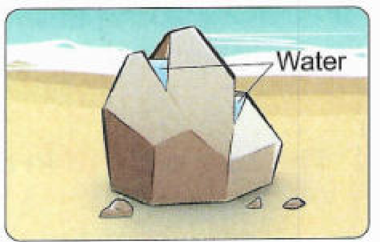
mechanical	ميكانيكية	dissolve	تذوب	friction	احتكاك	cracks	شقوق
chemical	كيميائية	physical	فيزيائية	pushes	يدفع	wider	أكثر اتساعًا

4. **The role of temperature in mechanical weathering :**

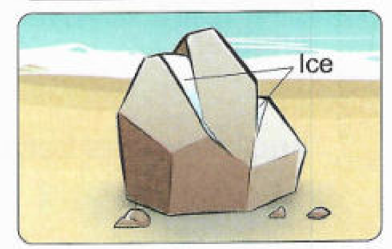
Water flows into the tiny cracks of rocks.



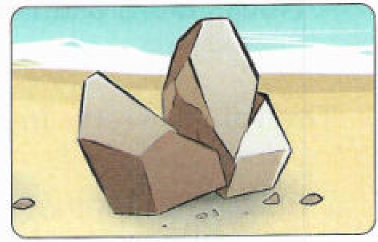
When the temperature gets very cold, water freezes forming ice that expands and makes the cracks of rocks become wider.



When the temperature increases, the ice melts, so water fills newly formed wide cracks again.



The cycle of freezing of water and melting of ice continues until rocks are broken down.



B. Chemical weathering :

It is the change of the structure of rocks due to chemical reactions.

Chemical weathering happens due to the chemical reactions of rocks with some other materials such as :

1. Oxygen.
2. Water.
3. Acid rain.
4. Acid produced by some living organisms.

1. **The role of oxygen in chemical weathering :**
Oxygen of air reacts with iron of some rocks forming red-colored rust, this reaction can weaken rocks and break them down easily.



Red colored rust in rocks

freeze	تتجمد	produce	ينتج	melting	ذوبان	pebbles	حصى
expands	تتمدد	reaction	تفاعل	weaken	يضعف	periods	فترات
flow	تدفق	acid rains	أمطار حمضية	fill	يملأ	rust	صدأ


Limestone cave

2. The role of water in chemical weathering :

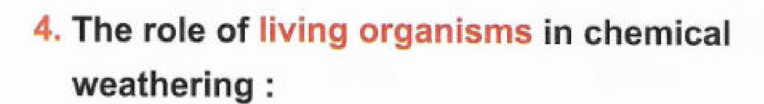
When water dissolves minerals in a rock, the dissolved minerals combine again forming new shapes as in limestone caves.



3. The role of acid rain in chemical weathering :

When the acid rain fall on rocks, it can dissolve minerals found in these rocks, causing the break down of rocks.


Acid rains



4. The role of living organisms in chemical weathering :

Some tiny organism called "Lichens" produce acids on rocks that dissolve minerals found in these rocks and break them down.


Lichens on rocks

Notes

1. Lichens is tiny plant-like organisms.
2. Weathering happens over long periods of time.
3. It is hard to see weathering during its occurrence, but you can see its effects all around you in the little rocks, pebbles and sand that were parts of much larger rocks.



Check your understanding

▸ **Complete the following sentences using the words below :**

(acids – oxygen – mechanical – chemical)

1. Types of weathering can be classified into mechanical weathering and .... weathering.
2. Freezing of water inside cracks of rocks may cause a type of weathering known as .... weathering.
3. Chemical reaction between iron and .... causes its rusting.
4. Lichens produce .... that may cause breaking down of rocks.

minerals	معادن	cave	كهف
limestone	الحجر الجيري	lichens	الأشنات (كائنات حية دقيقة تشبه النباتات)
combine	تجمُّع		

In the Assessment Book :
Try to answer :
Self-Assessment (14)

Exercises on Lesson 2

● Understand ● Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. The condition of atmosphere including temperature, wind and rains is known as ....
   a. weather. b. weathering. c. erosion. d. deposition.

2. The dropping of sediments in a new place, is known as .... *(Minia 2023)*
   a. weathering. b. deposition. c. freezing. d. erosion.

3. Limestone caves are formed due to the combination of ....
   a. dissolved minerals. b. red-colored rusts.
   c. living organisms. d. acid rains.

4. Lichens produce .... on rocks that dissolve minerals found in these rocks.
   a. oxygen b. acids c. water d. rain

5. Rusting of a statue is an example of the action of .... process. *(Menoufia 2023)*
   a. deposition b. erosion
   c. mechanical weathering d. chemical weathering

6. Breaking of statues is an example of ....
   a. erosion. b. weathering. c. deposition. d. sedimentation.

7. All the following are processes that can change the Earth's surface, except .... *(Cairo 2023)*
   a. digestion. b. erosion. c. weathering. d. deposition.

8. When water freezes, it expands. This means that ....
   a. it will evaporates. b. its temperature increases.
   c. its volume increases. d. its volume decreases.

9. All the following are from causes of chemical weathering, except ....
   a. oxygen. b. water. c. acid rains. d. clouds.

10. Water can produce .... that affect(s) the shape of the Earth.
    a. mechanical weathering only
    b. chemical weathering only
    c. both mechanical and chemical weathering
    d. neither mechanical nor chemical weathering

2 Put (✓) or (✗) :

1. Wind can be considered one of the factors that cause weathering. ( )
2. Plant roots help in the formation of rocks. ( )

3. Limestone caves are formed by the action of mechanical weathering. ( )
4. Friction force between rocks and sand carried by wind may cause weathering. ( )
5. When iron in rocks rusts, the rock becomes more stronger. *(Suez 2023)* ( )
6. There are many types of sediments like sand, rocks and soil. ( )
7. The movement of sediments from one place to another is known as weathering. ( )
8. Shaping the Earth is usualy starts by deposition process. ( )
9. All physical factors of mechanical weathering lead to breaking down of rocks. ( )
10. Oxygen in air reacts with iron of some rocks forming green-colored rust. ( )

3 Write the scientific term of each of the following :

1. A process in which rocks are broken down into smaller particles. (..................) *(Giza 2023)*
2. A process in which small broken rocks move from a place to another by the help of wind or water. (..................)
3. A process in which the sediments are dropped in a new location by the action of wind, water and gravity. (..................)
4. A part of plant grows inside cracks of rocks causing its weathering. (..................)
5. The condition of atmosphere at a specific time and place. (..................)
6. It is a type of weathering through which acids of lichens dissolve minerals of rocks. *(Qalyoubia 2023)* (..................)
7. It is a type of caves that is formed when dissolved minerals of rocks combine again in new shapes. (..................)
8. It is a process through which water forming ice in cracks of rocks. (..................)
9. A gas in air combines with iron of some rocks and causes its weakness. *(Dakahlia 2023)* (..................)

4 Complete the following sentences :

1. During .... process, rocks are broken down or weared away.
2. There are two types of weathering which are .... weathering and .... weathering.
3. The type of weathering in which the rocks are broken down due to plant roots is known as .... weathering.
4. The type of weathering in which the structure of rocks changes due to chemical reactions is known as .... weathering.

5. Some tiny plant-like organisms produce .... that can dissolve minerals of rocks causing its breaking down.
6. Shaping the Earth started by weathering, then .... and ends with deposition.
7. Breaking a statue is an example of mechanical weathering, while rusting of an iron statue is an example of .... weathering.
8. Lichens produce acids on rocks that dissolves its .... *(Behira 2023)*
9. Mechanical weathering takes place when .... occurs between sand carried by wind and rocks.
10. Flowing water which carries small gravel and sand may break down large .... and cause .... weathering.

5 Give reasons for :

1. Iron in rocks may rust. *(Cairo 2023)*

....

2. Water play an important role in the formation of limestone caves.

....

6 What happens if ...?

1. Lichens growing on rocks produce acids.

....

2. A red-colored rust is formed on some rocks. *(Behira 2023)*

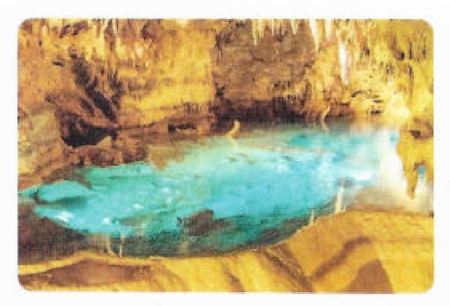
....

7 Put (M) in front of the example of mechanical weathering and (C) in front of the example of chemical weathering :

1. Breaking down of rocks by the effect of sand which is carried by wind. (....................)
2. Rusting of iron in rocks due to the reaction between iron and oxygen. (....................)
3. Breaking down of rocks by the effect of acids produced by Lichens. (....................)
4. Breaking down of rocks by the effect of freezing of water and melting of ice inside their cracks. (....................)
5. Breaking down of rocks by the effect of growth of plant roots inside the cracks of rocks. (....................)
6. Breaking down of rocks by the effect of small gravel and sand which are carried by flowing water. (....................)

8 Look at the following pictures, then put (✓) or (×) :


Rust in rocks
Picture (A)


Limestone caves
Picture (B)

1. Picture (A) is an example of mechanical weathering. ( )
2. Picture (B) is formed when water dissolves minerals in a rock. ( )
3. Picture (A) is formed by the effect of acids which are produced from Lichens. ( )
4. The type of weathering which forms picture (B) is the same type of weathering which forms picture (A). ( )

LESSON THREE

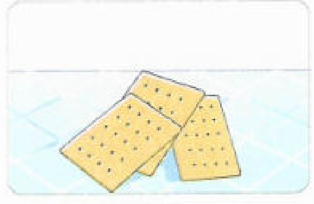
Activity 7 Modeling Mechanical and Chemical Weathering

▶ **Put (✓) or (✗) :**

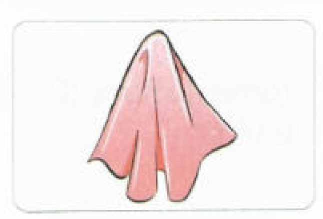
1. Water plays an important role in both mechanical and chemical weathering. (   )
2. The chemical weathering can change the color of rocks. (   )

- Weathering of rocks is a slow natural process that often takes many years to see its effect.
- In this activity we will model and explore both mechanical and chemical weathering to understand the similarities and differences between them.

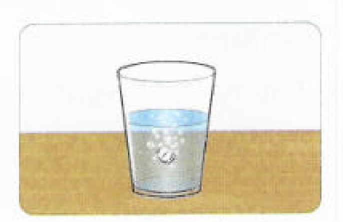
Tools



Biscuits (crackers)



Piece of cloth



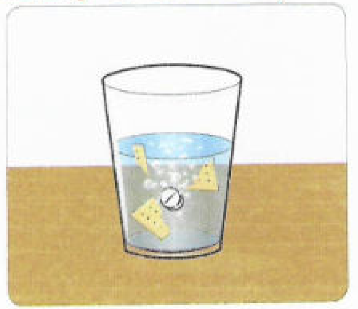
Antacid tablet in a cup of water

Steps

1. Crush some biscuits inside the piece of cloth with your hands for few seconds.



2. Put some other biscuits in a cup of water contains antacid (Antacid is a medicine used to treat the high acidity of stomach).



Observations

1. In the first step, biscuits are broken down into smaller parts, but they still look like biscuits.
2. In the second step, biscuits dissolve and mix with water containing antacid causing a formation of different material.

modeling	تصميم نموذج	natural	طبيعي	crush	كشر	medicine	دواء
tools	أدوات	cloth	قماش	acidity	حموضة	treat	يعالج
crackers	مقرمشات	antacid tablet	قرص مضاد للحموضة	explore	اكتشاف	observation	مشاهدة

Conclusions

1. In the mechanical weathering, the substance is broken into smaller parts without changing its nature.
2. In the chemical weathering, the substance is broken into smaller parts and another substance is formed as a result of chemical reactions.
3. Chemical weathering causes greater changes to substances than that happen in mechanical weathering.



Note

Scientists use models to recreate the weathering process to understand it better, because weathering takes a long time in real life, and the rocks we can see now have been weathered over hundreds of years.

So, we can summarize the previous conclusion in the following figure :

Mechanical weathering
Cause changing of the structure of rocks without any change in their nature.

Similarities
Both of them cause breaking down of rocks into smaller parts.

Chemical weathering
Cause changing of the structure of rocks producing new materials.



Check your understanding

Choose the correct answer :

1. The chemical weathering makes .... changes than the mechanical weathering. (weak – great – little)
2. Occurrence of weathering takes .... in real life. (some hours – few days – hundreds of years)

Activity 8 Weathering

- We have learned in the previous lesson that, there are two types of weathering which are mechanical weathering and chemical weathering.

• **Now**, we are going to deduce if this landform shown below is affected by mechanical weathering or chemical weathering.



- You will notice from the previous picture that rocks are broken into smaller pieces with different shapes of the same material.

- This process is similar to that happened to biscuits broken by hands in the previous activity, this leads us to conclude that the landform shown above has been mechanically weathered over time.



Check your understanding

▸ **Put (✓) or (×) :**

1. In both mechanical weathering and chemical weathering, the substance is broken down into smaller parts. ( )
2. A new substance is formed if mechanical weathering occurs. ( )
3. In mechanical weathering the rocks are broken into smaller pieces with different shapes and new materials. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (15)

deduce	يستنتج	lead	يؤدي	landforms	تضاريس

Exercises on Lesson 3

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. The breaking of rocks into smaller particles without changing their properties is called .... *(Assiut 2023)*
   a. mechanical weathering. b. chemical weathering.
   c. deposition. d. erosion.
2. Which of the following does not cause mechanical weathering ? ....
   a. Roots of plants. b. Acid rains.
   c. Wind movement. d. Water movement. *(Cairo 2023)*
3. The breakdown of rocks either mechanically or chemically is called ....
   a. rusting. b. weathering. c. deposition. d. erosion.
4. Crushing a piece of biscuit by hands is similar to .... of rocks.
   a. mechanical weathering b. chemical weathering
   c. erosion d. deposition

2 Put (✓) or (✗) :

1. Roots of plants can slowly grow over time through small cracks in rocks causing chemical weathering. ( )
2. When water freezes, its volume increases. *(Qena 2023)* ( )
3. Reaction between oxygen with the iron of some rocks causes its chemical weathering. ( )
4. Grinding of biscuits by hands into fine powder has the same effect of mechanical weathering of rocks. ( )

3 Write the scientific term of each of the following :

1. A process in which a large rock is broken into small pieces. *(Minia 2023)* (........)
2. A process that takes place in rocks and can be explained by pressing strongly on cubes of sugar until it becomes a powder. (........)
3. A process in which the colors of paints of houses are changed as a result of falling of acid rains. (........)

4 Complete the following sentences :

1. The cracks caused by freezing of water and melting of ice represent .... weathering.
2. In the .... weathering, the chemical structure of rocks doesn't change.
3. Putting some biscuits in a cup of water that contains antacid is like the .... weathering of rocks.
4. Formation of limestone caves is an example of .... weathering. *(Luxor 2023)*

LESSON FOUR

Activity 9 Erosion

▶ Put (✓) or (✗) :

1. Earth surface is reshaped through some processes like weathering, erosion and deposition. ( )
2. After breaking down of rocks into smaller particles, they never move from a place to another. ( )

- We have learned in the previous lessons that the large rocks are broken down into smaller particles during weathering process.
- Once the rock has been broken, it is ready for **erosion.**

Erosion :

It is the process in which the small particles (sediments) of sand, soil and rocks are moved to other places by wind, water and gravity.

Action of wind erosion

A gentle wind may carry sand grains for a short distance (about 1 meter), while stronger wind and hurricanes carry them for a longer distance.



Action of water erosion

- Rivers and floods carry sand, soil and rocks downstream.
- Sea waves pull sand away from beaches.
- Rain washes away the soil of farms that locate beside downhill.



Action of gravity erosion

The broken weathered rocks in a mountain can be pulled down at mountainsides by the effect of gravity.



sediments	رواسب	floods	فيضانات	water bodies	مسطحات مائية
gentle wind	رياح خفيفة	downstream	اتجاه جريان النهر	mountainsides	جوانب الجبال
soil	تربة	downhill	منحدر	gravity	جاذبية
hurricanes	أعاصير	settle	يستقر		

Notes

1. Sediments are small solid materials such as sand, soil and small particles of rocks.
2. Sediments are moved by wind and water and settles on the surface of land or the bottom of water bodies such as lakes and seas.
3. You can see the evidence left by erosion after hundreds, thousands or millions of years from its occurrence.



Check your understanding

▶ Put (✓) or (✗):

1. Floods are one of the factors that cause water erosion. (   )
2. Gravity does not affect the small rocks that have been broken down from mountains. (   )
3. A strong wind may carry sand grains for a short distance. (   )
4. Among the types of sediments are sand and soil. (   )

Activity 10 Deposition

- We have learned from the previous lessons how rocks can be broken into smaller pieces through weathering process, and these small pieces are carried away through erosion process.
  - **After erosion, the deposition process is the next stage that shows where these pieces of rocks might end up.**
  - When the wind blows, it picks up sand into the air.
  - As the wind moves, the sand may travel with it to a new place.
  - When the wind stops blowing, the sand falls onto the ground and deposites.

Deposition :

It is the process of laying down of sediments after its erosion.

- **Now,** let's see some examples that show how deposition process affects the shape of land.

Action of water in deposition :

- Running water in rivers play an important role in deposition process such as :
- A river can deposite a sandbar along its banks (sides).
- When a river carries sediments meet a sea, these sediments are deposited there forming a delta such as the Nile Delta.



The Nile Delta

Delta :

It is a fan-shaped (triangle-shaped) mass of mud and other sediments that forms where a river enters a large body of water.

- Sea waves also move sand from one place to another new place where it deposites there.

laying down	اسقاط	delta	دلتا	triangle	مثلث
stage	مرحلة	blowing	هبوب	mud	طين
sandbar	شريط من الرمال	river banks	ضفاف النهر	banks	ضفاف

Action of wind deposition :

- Weak and strong winds play an important role in deposition process such as :

Weak winds	Strong winds
- They can form small sand dunes.	- They can form large sand dunes.
Example : • Sand dunes on a beach.	**Examples :** • Sand dunes In : - Western Desert in Egypt. - Rub' Al Khali in the Arabian Peninsula.



Check your understanding

▶ Choose from column [B] what suits it in column [A] :

(A) Deposition factors	(B) Its effect
1. Wind in the desert.	**a.** Formation of a delta.
2. A river meets the sea.	**b.** Formation of sand dunes.

1. .... **2.** ....

In the Assessment Book :
Try to answer :
Self-Assessment (16)

Exercises on Lesson 4

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. Moving of sediments from a place to another represents .... process.
   a. weathering b. photosynthesis c. erosion d. deposition
2. A gentle wind may carry sand for a .... distance, but the hurricanes can carry sand for a .... distance.
   a. long – shorter b. long – longer c. short – shorter d. short – longer
3. A .... is formed where rivers meet a sea.
   a. delta b. mountain c. volcano d. canynon
4. Which of the following arrangements is correct about reshaping Earth's surface? ....
   a. Erosion → Weathering → Deposition.
   b. Erosion → Deposition → Weathering.
   c. Deposition → Erosion → Weathering.
   d. Weathering → Erosion → Deposition.
5. Each of the following plays a role in erosion process, except ....
   a. blowing wind. b. water floods.
   c. sunlight d. Earth's gravity. *(Qena 2023)*
6. Gentle wind can carry .... for a short distance.
   a. a large rock b. sand grains
   c. a large body of water d. a big mass of mud
7. Pulling sand away from beaches by sea waves, is considered as an example of ....
   a. mechanical weathering. b. chemical weathering.
   c. erosion. d. deposition.
8. Pulling down broken weathered rocks at mountainsides occurs by the effect of ....
   a. gentle wind. b. freezing of water.
   c. Earth's gravity. d. chemical weathering.
9. When a river that carries sediments meet a sea, ... is formed. *(Minia 2023)*
   a. a large mountain b. a triangle-shaped delta
   c. a small sand dune d. a large sand dune

2 Put (✓) or (✗) :

1. The effect of erosion may last for hundreds of years. ( )
2. Sea waves may cause erosion of beaches. ( )
3. Gravity pulls rocks down the mountainsides causing its erosion. *(Giza 2023)* ( )
4. Deposition process never change the shape of the land. *(Alex. 2023)* ( )
5. Sediments are usually liquid materials that settle on the surface of land. ( )
6. Strong wind and hurricanes carry sand grains for a short distance. ( )
7. Blowing of wind and flooding of water play an important role in erosion process. ( )
8. Nile delta is a triangle-shaped mass of mud and other sediments. ( ) *(Cairo 2023)*
9. Gentle winds can form large sand dunes like that in Egyptian western desert. ( )

3 Write the scientific term of each of the following :

1. It is the process by which natural forces move weathered rocks and soil from one place to another. (..................)
2. It is the process in which weathered rocks and soil are layed down or dropped by wind, water or gravity. *(Dakahlia 2023)* (..................)
3. A fan-shaped (triangular) mass of sediment that is formed where a river enters a larger body of water like seas. *(Menoufia 2023)* (..................)
4. A hill of sand created by the wind. *(Qena 2023)* (..................)
5. They are small solid materials such as sand, soil and small rocks that carried by water to another place. (..................)
6. The force that pulls down broken weathered rocks at mountainsides. (..................)

4 Complete the following sentences :

1. Wind, ... and gravity are natural factors that control erosion process.
2. Sand grains fall on the ground when the .... carrying it stops.
3. Sediments are moved by the effect of .... and .... then settles on the surface of land or the bottom of water.
4. Blowing of strong .... in the desert may form large sand dunes. *(Cairo 2023)*
5. Strong wind and hurricanes carry .... for a long distance. *(Ismailia 2023)*
6. Gentle winds can form small .... like that present at sea beaches. *(Alex. 2023)*

5 Give reasons for :

1. Formation of a delta when a river meets a sea.

....

2. Formation of small sand dunes on a beach.

....

3. Formation of large sand dunes at Western Desert in Egypt.

....

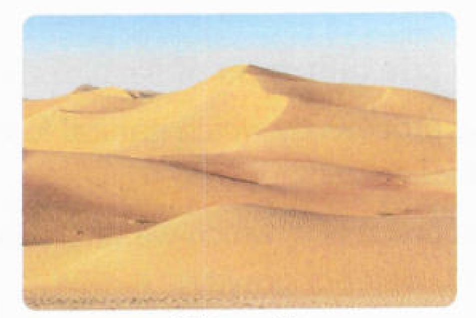
6 What happens when ...?

A river carries sediments meet a sea. *(Alex. 2023)*

....

7 Study the following pictures of sand dunes, then complete the sentences below :


Picture (1)


Picture (2)

1. Sand dunes in picture number .... are formed by strong winds.
2. Sand dunes in picture number .... are formed by weak winds.

LESSON FIVE

Activity 11 Evidence of Change

▶ **Put (✓) or (✗) :**

1. The erosion process happens very slow. ( )
2. The deposition process happens without erosion. ( )

▶ **From the previous lessons, we have learned that :**

- The surface of the Earth is continuously changing from time to time.
- There are three processes that have an important role in changing the Earth's surface, which are weathering, erosion and deposition.

- **Now,** we will study how these processes happen in order.

Weathering : It is caused when wind or water wears down rocks or the shape of landform is changed by mechanical or chemical processes.



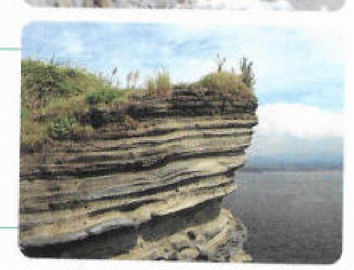
⇩

Erosion : It is caused when wind or water moves materials from one place to another.



⇩

Deposition : It occurs when eroded materials stop moving and settle on a surface, often forming layers over time.



▶ **By the action of the three previous processes we can observe changes in the Earth's surface such as :**

- Sand dunes which are small hills of sand found in a desert or on top of a beach.



hill تل continuously بشكل متواصل



The Nile Delta

- Delta which is a piece of land shaped like a triangle that is formed when a river enters a large body of water such as a sea or an ocean.



Note

Erosion and deposition are linked processes, erosion does not occur in one place without deposition in another, and vice versa.



Check your understanding

▸ Complete the following sentences using the words below :

(erosion – weathering – deposition)

1. The process in which rocks are broken down to form sediments is called ....
2. The process in which the eroded rocks stop moving and settle on a surface is called ....
3. The process in which sediments are transported by water or wind from a place to another is called ....

ocean	محيط	linked	مرتبط
transport	تنتقل	vice versa	والعكس صحيح

Activity 12 Record Evidence Like A Scientist

- In this concept, you have learned a lot about wearing down and moving rocks.
- **Now**, try to think like a scientist by writing your claim, your evidence and your scientific explanation about one of the main points of this concept through the four steps you have learned in the previous concepts.

Step 1 The Question

How do wind, water and weather change Earth's surface ?

Step 2 My Claim

....

....

....

Step 3 My Evidence

....

....

....

....

Step 4 My Scientific Explanation

....

....

....

....

....

Review on Concept (4.1)

To review this concept look at the **Assessment Book** "Part 2 : Final Revision".

In the Assessment Book :

Try to answer :

- Self-Assessment (17)
- Model Exam on Concept (4.1)

claim افتراض evidence دليل scientific explanation التفسير العلمي

Exercises on Lesson 5

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. As a result of breaking down of .... , sand is formed. *(Alex. 2023)*
   a. rubber b. plastic
   c. rocks d. glass
2. Conditions of atmosphere including temperature, wind and rains are known as ....
   a. weather. b. weathering.
   c. deposition. d. erosion.
3. The breakdown of rocks either mechanically or chemically is known as ....
   a. photosynthesis. b. weathering.
   c. erosion. d. deposition.
4. When a river meets a sea or an ocean, a .... is formed. *(Aswan 2023)*
   a. canyon b. volcano
   c. mountain d. delta

2 Put (✓) or (✗) :

1. The surface of the Earth never changes. *(Cairo 2023)* (   )
2. Limestone caves are formed as a result of chemical weathering. (   )
3. The volume of water decreases when it freezes. *(Qena 2023)* (   )

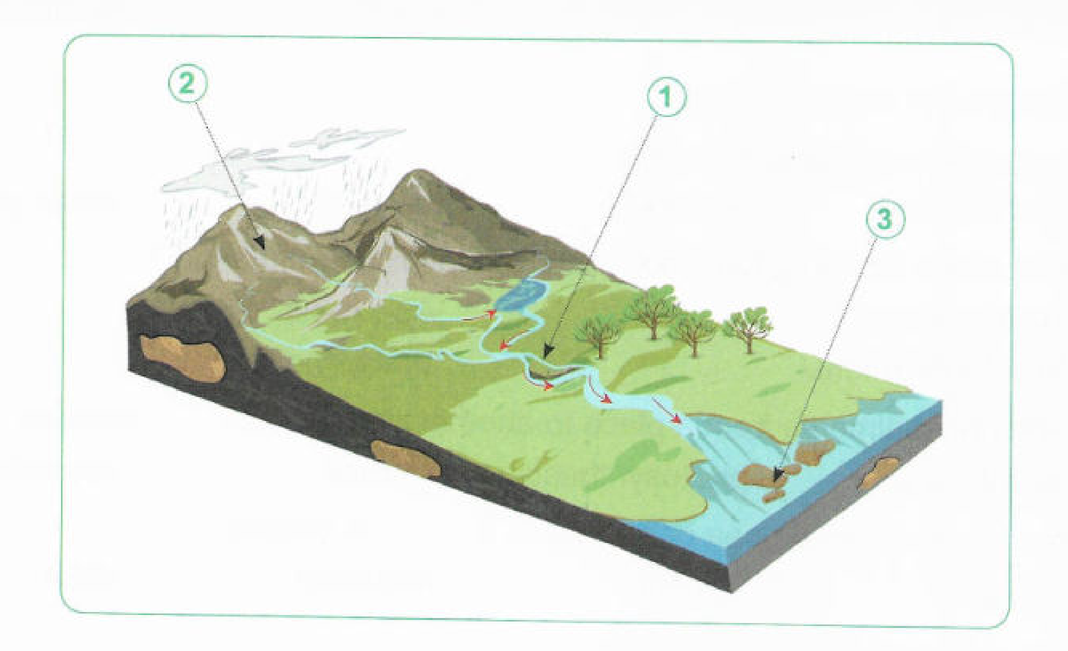
3 Write the scientific term of each of the following :

1. They are deep valleys carved by flowing water. (....................)
2. A process in which small broken rocks move from a place by the help of wind or water. *(Luxor 2023)* (....................)
3. A process in which the moving sediments are dropped in a new place. (....................)

4 Complete the following sentences :

1. The origin of sand is the breaking down of some types of .... *(Giza 2023)*
2. The type of weathering in which the rocks are broken down due to the presence of plant roots is known as .... weathering.
3. The cracks caused by heating and cooling of water represent a type of weathering known as .... weathering.
4. When strong .... blow in the desert, large sand dunes are formed. *(Ismailia 2023)*

5 Look at the following figure, then choose the correct answer :



1. Arrow number .... indicates the occurrence of weathering process of mountain rocks by the effect of rain. (1 – 2 – 3)
2. Arrow number .... indicates the occurrence of erosion process to the small rocks at the sides of the river. (1 – 2 – 3)
3. Arrow number ③ indicates the delta which is formed by the effect of .... process. (weathering – erosion – deposition)

Model Exam 

on Concept (4.1)

Total mark
—
15

1 (A) Choose the correct answer : *(5 marks)*

1. The formation of canyons takes ....
   a. few minutes. b. few hours. c. few days. d. many years.
2. Which of the following does not cause mechanical weathering ? ....
   a. Roots of plants. b. Acid rains.
   c. Wind movement. d. Water movement.
3. Moving of sediments from a place to another represents .... process.
   a. weathering b. photosynthesis c. erosion d. deposition
4. When a river meets a sea or an ocean, a .... is formed.
   a. canyon b. volcano c. mountain d. delta

(B) Give a reason for the following :

Iron in rocks may rust.

....

....

2 (A) Put (✓) or (✗) : *(5 marks)*

1. Sea waves may cause erosion of beaches. (   )
2. The surface of Earth changes from time to time. (   )
3. All physical factors of mechanical weathering lead to breaking down of rocks. (   )
4. When water freezes, its volume decreases. (   )

(B) What happens if ...?

Lichens growing on rocks produce acids. (   )

....

....

3 (A) Write the scientific term of each of the following : *(5 marks)*

1. A process in which small broken rocks move from a place to another by the help of wind or water. (.....................)
2. A process in which the colors of paints of houses are changed as a result of falling of acid rains. (.....................)

3. A Fan-Shaped (triangular) mass of sediments that is formed where a river enters a larger body of water like seas. (.....................)
4. They are deep valleys covered by flowing water. (.....................)

(B) Study the following figures, then choose the correct answer below :


Figure (1)


Figure (2)

1. The force of water forms ....
   a. figure (1) only.
   b. figure (2) only.
   c. figure (1) and (2).
   d. neither figure (1) nor (2).
2. Water that affects the item in figure (1) is considered as an example of ....
   a. human-made changes.
   b. artifical changes.
   c. fast changes.
   d. slow changes.

Model Exam 2
on Concept (4.1)

Total mark
____
15

1 (A) Choose the correct answer : *(5 marks)*

1. Sand is formed due to breaking down of ....
   a. glass. b. wood. c. rocks. d. plastic.
2. Which of the following does not cause mechanical weathering ? ....
   a. Roots of plants. b. Acid rains.
   c. Wind movement. d. Water movement.
3. Limestone caves are formed due to the combination of ....
   a. dissolved minerals b. red-colored rusts
   c. living organisms d. acid rains
4. Each of the following plays a role in erosion process, except ....
   a. blowing wind. b. water floods.
   c. sunlight. d. Earth's gravity.

(B) Give a reason for the following :

Formation of canyons is considered as an example of slow changes.

....

2 (A) Put (✓) or (✗) : *(5 marks)*

1. All changes that occur on the Earth's surface take hundreds of years. ( )
2. There are many types of sediments like sand, rocks and soil. ( )
3. Roots of plants can slowly grow over time through small cracks in rocks causing chemical weathering. ( )
4. Water can cause the two types of weathering. ( )

(B) What happens if ... ?

A river carries sediments meet a sea. ( )

....

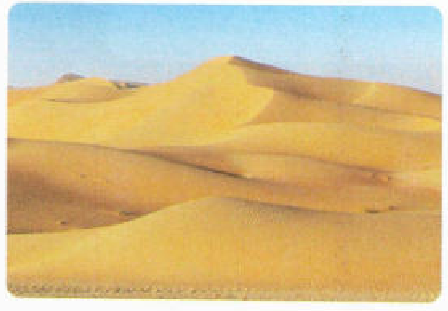
3 (A) Complete the following sentences :

1. Breaking a statue is an example of mechanical weathering, while rusting of an iron statue is an example of .... weathering.
2. Sand grains fall on the ground when the .... carrying it stops blowing.

3. When strong wind blow in the desort, large sand .... may be formed.
4. Cracks caused by freezing of water and melting of ice represent .... weathering.

(B) Study the following pictures of sand dunes, then complete the sentences below :

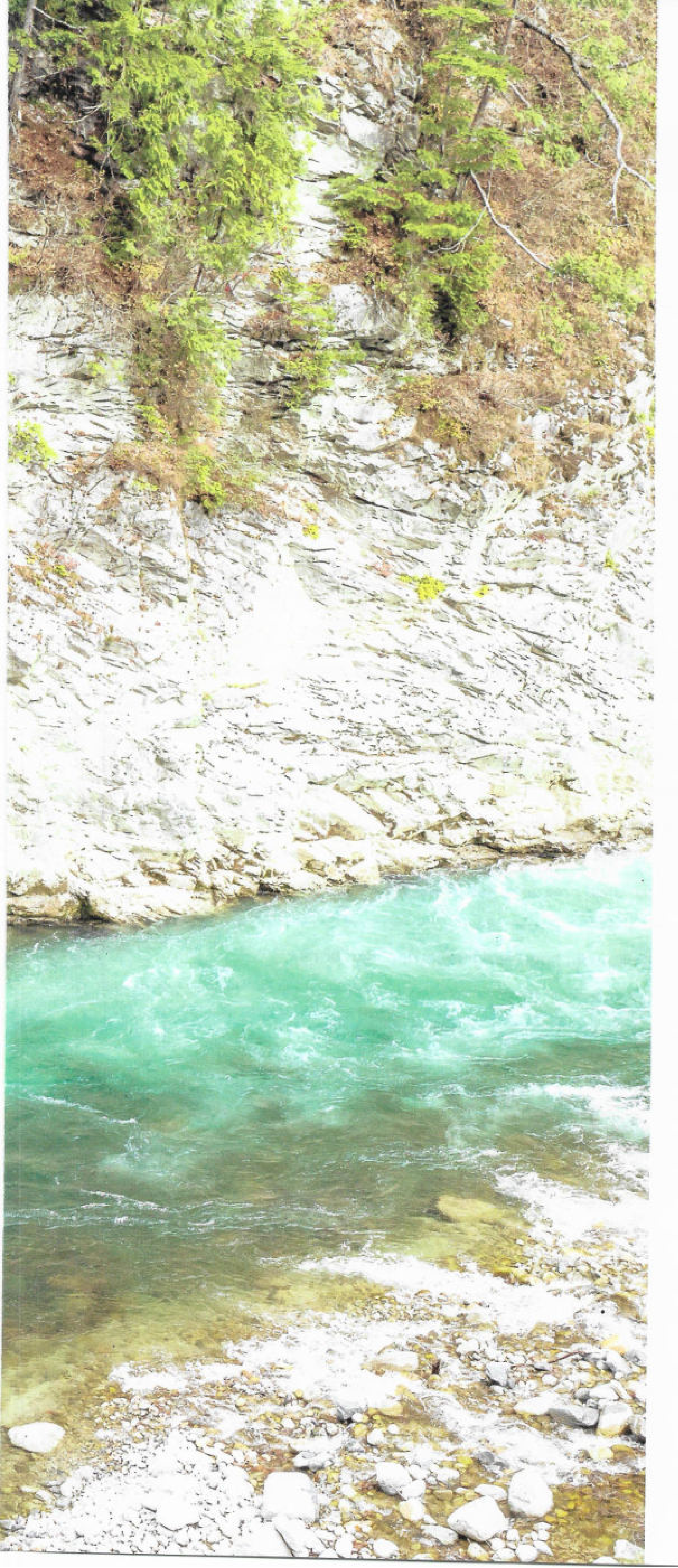

Picture (1)


Picture (2)

1. Sand dunes in picture number .... are formed by strong winds.
2. Sand dunes in picture number .... are formed by weak winds.

Concept

4.2 Changing Landscapes



Learning outcomes

By the end of this concept, your child will be able to :

- Ask questions about the formation and stability of landforms that change slowly and quickly.
- Provide evidence that weathering and erosion by wind and water cause changes on Earth's surface over time.
- Develop a model that describes patterns in the formation of deltas and predicts where deltas are likely to form.
- Describe the interactions between water and landforms in a watershed and between wind and sand dunes at the beach.
- Use evidence from patterns in rock formations to explain the changes in Earth's surface over time.

Key vocabulary

- Canyons
- Delta
- Dune
- Valleys

Notes For Parents On Concept (4.2)

Lessons	Activities	What you should do with your child
1	Activity 1	Explain to your child how canyons are formed.
	Activity 2	Discuss with your child how canyons differ in shape and colors.
	Activity 3	Explain to your child an example about understanding the formation of landforms can help predict future change.
2	Activity 4	Discuss with your child the different changes which may occur in the school landscape, and their similarities with large landscapes.
	Activity 5	Discuss with your child the formation of canyon.
3	Activity 6	Explain to your child the similarities and differences between canyons and valleys.
	Activity 7	Discuss with your child the formation of deltas.
4	Activity 8	Explain to your child the erosion by wind and formation of sand dunes.
	Activity 9	Discuss with your child how wind can move sand and may be form dunes.
5	Activity 10	Let your child think about how we can describe landforms.

LESSON ONE

Activity 1 Can You Explain ?





You have learned in the previous concept that many factors can change and break down Earth's surface such as weathering, erosion and deposition and they form many landforms as canyons.

▶ **As you have learned, canyons as shown in pictures above are deep valleys carved by flowing water.**

How are canyons formed ?

- A canyon can be formed in many ways, such as weathering and erosion due to wind, water and other factors.
- Canyons can take millions of years to be formed.

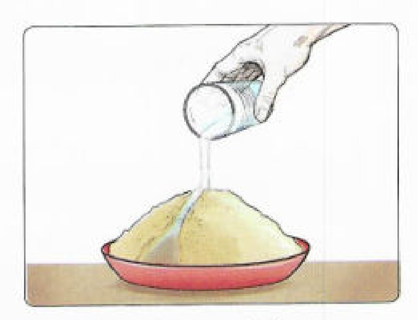
▶ **In this concept, we will study :**

- How landscapes change.
- Canyon formation.
- Canyons and valleys.
- Delta formation.
- Wind erosion.
- Rock layers of Wadi Al-Hitan.

canyon	أخدود	valley	وادي
landforms	تضاريس	landscape	مظاهر السطح

Activity 2 Canyons

▶ **Look at the opposite picture, then put (✓) or (×) :**

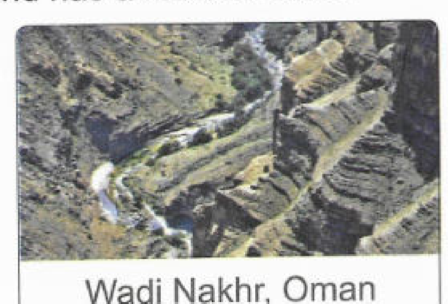


1. The flow of water on the sand can change its shape. ( )
2. The sand particles remain in there positions when the water flows over them. ( )

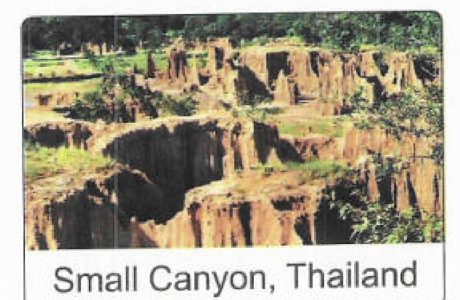
- When the water is moving over the sand, it pushes some of the sand out of the way.
- As the water moves the sand, it leaves an impression where the water flowed.
- This is the same idea of canyons formation.
- Canyons are formed due to erosion by water for a long period of time, as water can wear away landscapes and move sediments.

▶ **Canyons differ in their colors, texture and shape of rocks, where :**

- Wadi Nakhr canyon in Oman, its color is brown and black but the Small Canyon in Thailand has a reddish color.



Wadi Nakhr, Oman

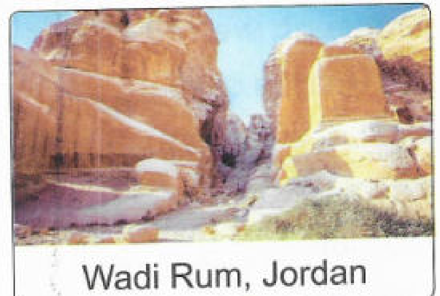


Small Canyon, Thailand

- Canyons can have V-shape as in colored canyons in Sinai and Wadi Rum canyon in Jordan.



Colored Canyon, Sinai



Wadi Rum, Jordan



Check your understanding

▶ Put (✓) or (×) :

1. Canyons are formed due to long term erosion. ( )
2. Wadi Nakhr canyon in Oman has V-shape. ( )

impression	أثر	Jordan	الأردن	Thailand	تايلاند
push	يدفع	texture	ملمس	reddish color	محمر اللون
wear away	يسبب الأكل	flow	يتدفق	remain	تبقى

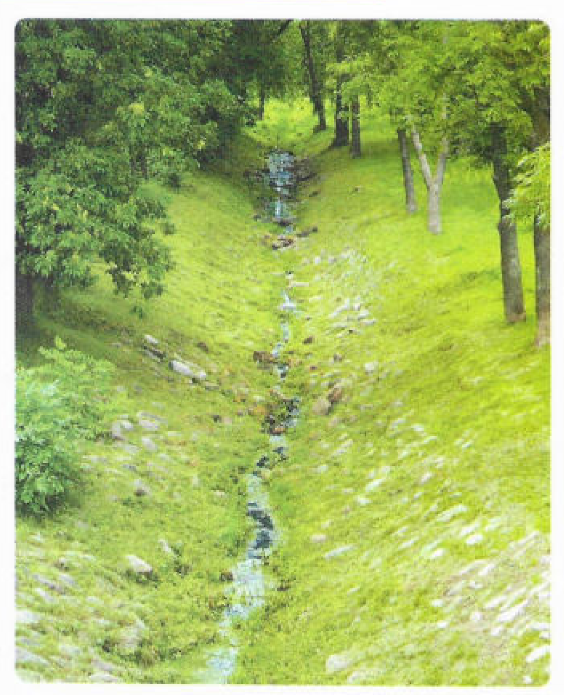
Activity 3 What Do You Already Know About Changing Landscapes ?

▶ **Understanding the formation of landforms help predict future changes :**

Example:

Canyon formation :

- The opposite picture shows a small canyon at the beginning of its formation by the effect of a stream of water, which can be observed from the following evidence :
  - Trees and other plants that are growing on both sides of the canyon, need water to grow.
  - The sides are gently sloped due to the help of water in wearing (eroding) the sides down.



Small canyon

▶ **From the previous example we can predict that :**

- Water streams that flow over flat land will probably form small canyons.
- The small canyon shown above could get deeper if it rained a lot, and water ran through it again.

▶ **Beside canyons, there are many other forms of landforms such as :**



Mountain



Dunes



Valley



Check your understanding

▶ **Complete the following sentences :**

1. The canyon is formed by the effect of ....
2. The sides of .... are gently sloped.

In the Assessment Book :
Try to answer :
Self-Assessment (18)

gently sloped	منحدر قليل الميل	probably	على الأرجح	evidence	دليل
wearing sides down	تآكل الجوانب	deeper	أعمق	predict	توقع / تنبأ

Exercises on Lesson 1

● Understand ● Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. A canyon may be formed due to the effect of ………………… *(Giza 2023)*
   a. erosion and deposition. b. weathering and erosion.
   c. weathering and deposition. d. deposition only.

2. A canyon can be formed by the effect of …………………
   a. plants. b. animals. c. water. d. sunlight.

3. A canyon may take ………………… of years to be formed. *(Suez 2023)*
   a. hundreds b. tens c. millions d. couple

4. If the rain falls over a small canyon for several times per year, …………………
   a. its depth increases. b. its depth decreases.
   c. it becomes flat. d. it is not be affected.

5. Wadi Nakhr in Oman is formed because water move ………………… away by the effect of erosion.
   a. sunlight b. wind c. sediments d. mountains

6. Among canyons which have V-shape are …………………
   a. Wadi Nakhr and the Small Canyon.
   b. the Colored Canyon and Wadi Rum
   c. the Small Canyon and the Colored Canyon.
   d. Wadi Nakhr and Wadi Rum.

2 Put (✓) or (✗) :

1. A canyon may be formed due to the effect of wind weathering and erosion. ( )
2. Wadi Rum in Jordan is an example of dune. ( )
3. When the water is moving over the sand, it leaves an impression on it. ( )
4. A canyon is formed due to the effect of water stream on a flat land. ( )
5. A canyon may take one year only to be formed. *(Qalyoubia 2023)* ( )
6. All canyons are similar in shape of rocks and colors. *(Behira 2023)* ( )
7. Earth's surface changes continuously as it is affected by weathering and erosion. ( )
8. Water streams that flow over flat land may form small canyons. ( )
9. All canyons must have V-shape. ( )

3 Write the scientific term of each of the following :

1. It is the landform that is formed by the effect of weathering and erosion due to wind, water or other factors. (..................)
2. The two processes that have the main role in formation of canyon. (..................)

4 Complete the following sentences by using the words below :

(impression – water – canyon – gently)

1. When the rain falls on a flat sandy land, it will leave an .... on the land.
2. Wadi Nakhr in Oman is an example of .... landform.
3. Canyon is formed by the effect of the stream of ....
4. The sides of the canyon at the beginning of its formation are .... sloped.

5 Give a reason for the following :

Trees and other plants are growing on both sides of small canyons. *(Alex. 2023)*

....

....

6 What happens to ...?

1. A flat land, if a water stream flows over it.

....

....

2. A small canyon if it rained a lot and water ran through it for a longer time.

....

....

LESSON TWO

Activity 4 Landscapes in Your Environment

▶ **Put (✓) or (✗) :**

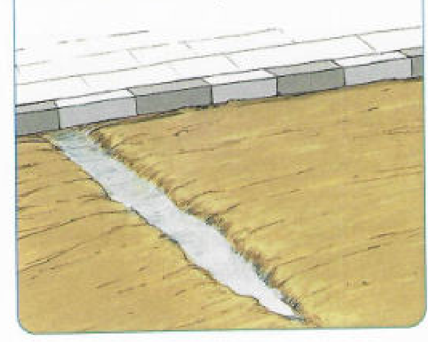
1. When water flows quickly,it causes more erosion. ( )
2. Canyons may be formed due to the effect of weathering only. ( )

▶ **Imagine that you go to your school after a rainy day, you can see some changes in the school landscape due to some processes happened, for example :**

- You can see rounded and worn small rocks and that is an evidence of weathering process.



- You can see an area with small canyons where soil was washed away after heavy rain and that is an evidence of erosion process.



- You can see a patch of sand in the playground after heavy rain and that is an evidence of deposition process.

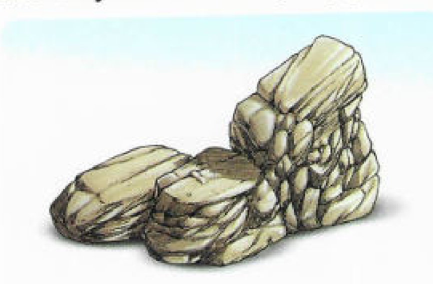


▶ **You can see the same processes happen in large landscapes in nature, where :**

School landscape | **Large landscape in nature**

▶ **Weathering process :**

Instead of weathering of small rocks at your school playground,



you can see big rocks of a mountain were broken off.

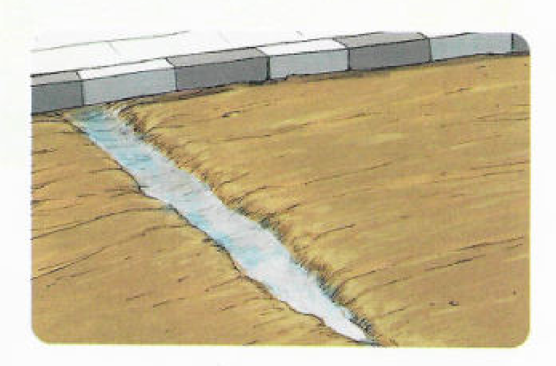


rounded	مستديرة	washed away	جرفت	playground	ملعب
worn	بالية	patch of sand	رقعة من الرمل	mountain	جبل
instead of	بدلًا				

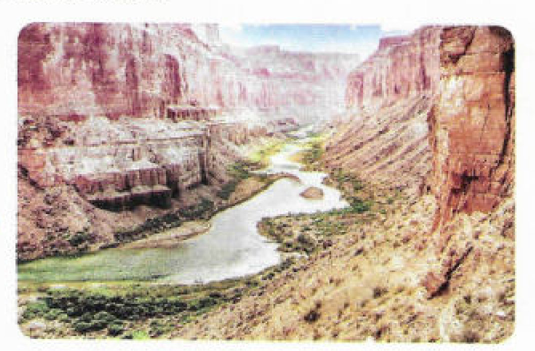
School landscape | **Large landscape in nature**

- **Erosion process :**

Instead of small canyons in the land of your school,



you can see the walls of a canyon were eroded by the effect of a river movement.



- **Deposition process :**

Instead of a patch of sand at your school playground,



you can see a river makes new land from sediments by deposition.



Note

It might be useful to recognize signs of weathering, erosion and deposition because it may help in building houses in safe places, where :

- People must not build a house on a hill that is eroding.
- People must not build a house very close to a river, as if the path of a river is changed, it causes weathering and erosion of the house.



Check your understanding

- **Put (✓) or (✗) :**

1. We can't see any changes in our environment after raining. ( )
2. In nature only, weathering takes place but in small landscapes deposition and erosion happen. ( )

sediments الرواسب recognize يلاحظ

Activity 5 Canyon Formation

▶ **Canyons are special types of valleys that have steep sides.**

- Many valleys including canyons are formed by the same way, where :

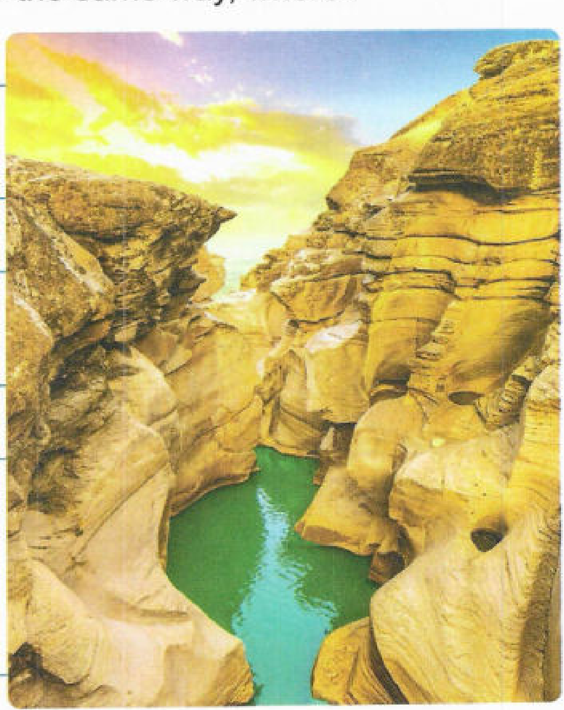
Gravity pulls rainwater downhill forming small streams.

⇩

These small streams join together forming a bigger stream (river).

⇩

The water of the river flows fast across the land and erodes a pathway through the landscape that makes the river carve out a valley.



Notes

1. The shape of a valley depends on several factors including :
   - The types of rocks exist in the landscape.
   - The speed, age and size of river that form the valley.
2. Big streams or rivers cause more erosion than small streams.
3. Rivers that flow fast cause more erosion than rivers with slow flow.

▶ **Now, let's study one of the most famous canyons on Earth which is called the "Grand Canyon" :**

Grand Canyon :

- It is located in United States of America.
- It is very large and steep canyon, and it contains many layers of rocks.
- This canyon contains a river in its bottom.



The Grand Canyon

downhill	لأسفل	steep	شديد الانحدار	carve out	ينحت
pull	يسحب	bottom	أسفل / قاع	pathways	طرق
streams	مجاري الأنهار	river	نهر		

• Formation of the Grand Canyon :

Over long period of time (millions of years), the water of the river there flowed so quickly due to travelling of the river down a steep slope.

↓

The water of the river eroded the rock and cut them deeply.

↓

The fast flow of water eroded a lot of sediment and carry them away that leads to the formation of the Grand Canyon.

Check your understanding

▶ Put (✓) or (✗) :

1. As the stream gets bigger, it causes more erosion. ( )
2. Rivers erode rocks and can form valleys and canyons. ( )
3. Canyon walls are not very tall and have gentle slopes. ( )
4. A canyon is a type of valley. ( )
5. Rivers can change a landscape very slowly. ( )
6. Fast moving rivers can cause a lot of erosion. ( )

In the Assessment Book :
Try to answer :
Self-Assessment (19)

cut them deeply يقطعهم بعمق flowed تدفق lead to يؤدي إلى

Exercises on Lesson 2

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. Among the evidence for the beginning of formation of small canyon by the effect of running water is ....
   a. the deep slopes of its sides.
   b. trees and plants that are growing on its sides.
   c. the little amount of rains that flow over it.
   d. the rocks and sediments that are found on its sides.

2. If the big rocks of a mountain were broken off, this is an evidence of ....
   a. weathering process only.
   b. erosion process only.
   c. weathering and erosion processes.
   d. weathering and deposition processes.

3. Recognize the sign of weathering, erosion and deposition may help in all the following, except ....
   a. building houses in safe places.
   b. not building houses on hills that are eroding.
   c. not building houses very close to a river.
   d. building houses on a hill affected by erosion.

4. The rainwater gather in small streams due to the .... downhill. *(Minia 2023)*
   a. pushing force of gravity
   b. pulling force of gravity
   c. pushing force of friction
   d. pulling force of friction

5. .... can erode valleys and form canyons across them.
   a. Rivers
   b. Mountains
   c. Dunes
   d. Rocks

6. The shape of the valley depends upon all of the following factors, except ....
   a. type of rocks.
   b. speed of the river.
   c. size of rocks.
   d. size of the river.

7. When the water of a river travels downhill on a steep slope, its speed ....
   a. stays constant.
   b. decreases to half.
   c. decreases to quarter.
   d. increases.

8. Rivers that flow fast can cause more .... than rivers with slow flow.
   a. chemical weathering
   b. erosion
   c. deposition
   d. formation

2 Put (✓) or (✗) :

1. The shape of a rock will be rounded and worn due to the effect of deposition process. ( )
2. The formation of a patch of sand in a certain place after a heavy rain is an example of the deposition process. ( )
3. Recognizing the signs of weathering, erosion and deposition may help in building houses in safe places. ( )
4. The Grand Canyon in USA is very large and steep. ( )
5. Rivers cause less erosion of rocks than small streams. ( )
6. The river movement can take the rocks away around mountains. ( )
7. The Grand Canyon took short period of time to be formed. ( )

3 Complete the following sentences by using the words below :

(speed – wind – sediments – valleys – gravity)

1. The sides of a mountain could be broken down by the effect of .... and weather erosion.
2. Canyon is a special type of .... that has steep sides. *(Cairo 2023)*
3. When the water of a river travels down a steep slope, its .... increases.
4. The force of water stream can erode a lot of .... of a mountain and carry them away.
5. Rainwater is pulled downhill forming small streams due to the effect of .... *(Ismailia 2023)*

4 Give reasons for :

1. It might be useful to recognize signs of weathering, erosion and deposition.

....

....

2. Valleys have different shapes.

....

....

5 What happens ...?

1. To a house that is built close to a river, if the path of the river is changed toward this house.

....

....

2. If a river erodes the sediments of a mountain over a long period of time.

....

....

(Ismailia 2023)

6 Complete the sentences below each picture using the following words :

(Weathering – Erosion – Deposition)



Small rocks of a mountain

1. .... process.



Formation of new lands at river's end

2. .... process.



Carving of a mountain by a river stream

3. .... process.

LESSON THREE

Activity 6 Canyons and Valleys

▶ **Put (✓) or (✗) :**

1. All valleys have the same shape. ( )
2. Gravity helps in forming valleys and canyons. ( )

▶ **We have known that the canyons are a special type of valleys.**
Now, let's study the similarities and differences between canyons and valleys.

Canyons

- They are the areas that were eroded in mountains.
- Their walls are usually very high (have great depth), steep, narrow and consist of many layers of rocks.

Similarities

- Both of them can be formed by rivers or streams.
- Both of them often have rivers or streams flow through the lowest points.

Valleys

- They are lowland areas in between mountains.
- They have gently sloped sides that usually surround a wide, flat plain.


A canyon


A valley



Check your understanding

▶ Complete the following sentences using the words below :

(canyons – rivers)

1. Valleys and canyons often have .... flow through the lowest points.
2. The walls of .... are usually very high.

sloped	منحدر	wide	واسع	depth	عمق
lowland	ارض منخفضة	similarities	أوجه التشابه	narrow	ضيق
flat plain	سهل منبسط				

Activity 7 Delta Formation

▶ **In the previous activities, you have learned that valleys and canyons are formed by weathering and erosion processes.**

In this activity, we will learn about deltas which are formed by deposition process, where :

Streams or rivers which flow fast carry sediments which called silt.



As the river water flows, it carries more and more sediments until the river water becomes full of sediments.



When the speed of the river water decreases, it drops the sediments (silt) forming deltas.



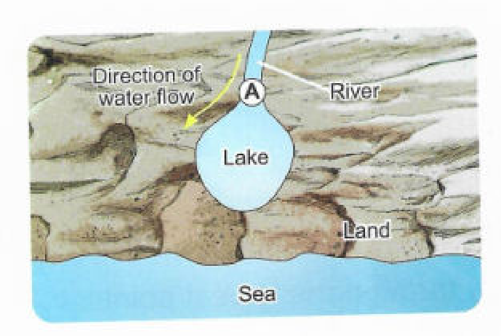
Small deltas



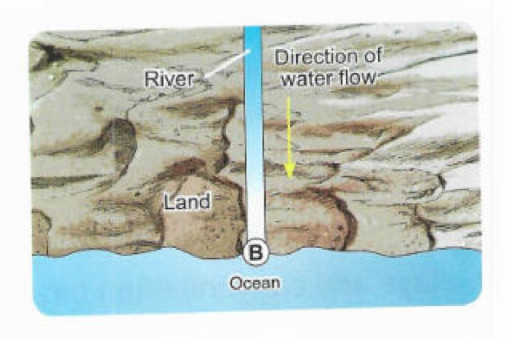
Silt is made of very fine bits of sand, clay or rock materials.

▶ **Most deltas are formed when fast flowing water enters slower moving water or still water such as :**

A delta can be formed at area Ⓐ as the river (fast flowing water) enters the lake (still water).



A delta can be formed at area Ⓑ as the river (fast flowing water) enters the ocean (slower flowing water).



silt	الطمى	fine bits	قطع دقيقة	delta	دلتا
clay	طين	still water	مياه راكدة		

Notes

1. Large wetlands are formed in deltas.
2. Plants that grow in the wetlands found in deltas increase deposition process because :
   - Plants are partly responsible for slowing down the river water.
   - Roots of plants help in trapping sediments.

The Nile River Delta :

- From the most famous deltas in the world is the Nile River Delta.
- The Nile River Delta has a triangular shape and it lies between Cairo and the northern coast of Egypt.
- It was formed in Egypt as a result of the rapid flow of the Nile River.
- It is characterized by the presence of fertile soil that allows the cultivation (planting) of different types of crops.



The Nile River Delta



Check your understanding

▶ Put (✓) or (x) :

1. Deltas are formed by erosion processes. (   )
2. Deltas are formed when the speed of river water increases. (   )

In the Assessment Book :
Try to answer :
Self-Assessment (20)

responsible for	مسئول عن	wetland	ارض رطبة	northern coast	الساحل الشمالى
Mediterranean Sea	البحر الأبيض المتوسط	crops	محاصيل	characterized	تتميز
fertile soil	تربة خصبة	lies	تقع	trapping	محاصرة
cultivation	زراعة				

Exercises on Lesson 3

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. The main difference between valleys and canyons is that valleys have ....
   a. many rock layers. b. steep slope walls.
   c. gently sloped sides. d. vertical walls.
2. Walls of canyons are characterized by all the following, except that they ....
   a. are very high. b. are gently sloped.
   c. have great depth. d. consist of many rock layers.
3. When the speed of the water stream that is run over a mountain increases, the rate of erosion will ....
   a. increase. b. be constant. c. decrease. d. become slower.
4. Deltas are formed when the speed of river water ....
   a. increases. b. decreases. c. doesn't change. d. become faster.
5. The delta is formed when the river stream entering all of the following, except .... *(Giza 2023)*
   a. a lake. b. a sea. c. a mountain. d. an ocean.
6. Nile River Delta is characterized by the presence of .... that allows the planting of different types of crops.
   a. mountains b. sand dunes c. polluted soil d. fertile soil

2 Put (✓) or (✗) :

1. Both canyons and valleys often have river in their bottom. *(Cairo 2023)* (   )
2. The walls of valleys are vertical and steep. (   )
3. Deltas are formed as a result of silt deposition. (   )
4. The Nile River Delta was formed by weathering and erosion processes only. (   )
5. Nile River Delta has a rectangular shape. (   )
6. Plant roots help in trapping sediments that causes the increase of deposition. (   )
7. Delta is formed when a running water meet a still water. (   )

3 Write the scientific term of each of the following :

1. They are lowland areas in between mountains and have gently sloped sides around rivers. (..................)
2. A land area that is formed by deposition process when a river enters a lake or a sea. (..................)

4 Complete the following sentences by using the words below :

(sand – speed – deposition – rivers – canyon – silt)

1. Both of valleys and canyons often have .... or streams flow through their lowest points. *(Giza 2023)*
2. Deltas are formed when the .... of the river water decreases, which causes deposition of sediment.
3. The plants of wetland and their roots cause increase of the rate of .... process.
4. When the sides of a valley become steep, this valley may be changed into a ....
5. Fast flow rivers carry sediments which called ...., and it is made of very fine bits of ...., clay or rock materials.

5 Give a reason for the following :

Plants of wetland areas help in formation of deltas.

....

6 What happens if ...?

A river stream enters a sea. *(Alex. 2023)*

....

7 Look at the following pictures, then complete the sentences below :

A river
Picture (A)

A valley
Picture (B)

A canyon
Picture (C)

1. If the water stream in picture .... is passed through a flat land for a short period of time, the landform in picture .... may be formed.
2. The landform in picture .... may be formed by the effect of wind and water erosion for a long period of time.
3. The landform in picture .... have gently sloped sides.
4. Both landforms in pictures .... and .... may have the water stream in picture .... in their lowest points.

LESSON FOUR

Activity 8 Wind Erosion

▶ **Put (✓) or (✗) :**

1. The movement of wind can form different landforms over years. ( )

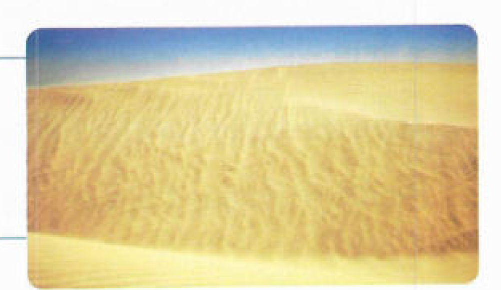
2. Erosion and deposition processes can create some landforms. ( )

In the previous lessons, you have learned that water can change the shapes of landscapes.

In this lesson, we will learn that wind also can be a powerful force of change of landscapes, where wind in desert can change the shape of rocks by erosion.

Wind erosion :

When wind blows across the land, it picks up sand and other rock particles and carries them along in the direction of the wind blows.



⇩

When this flying sediment hits a rock, it wears down that rock.



⇩

This process carves the rock into different shapes.



▶ **Some landforms are created by erosion and deposition processes at the same time as sand dunes.**

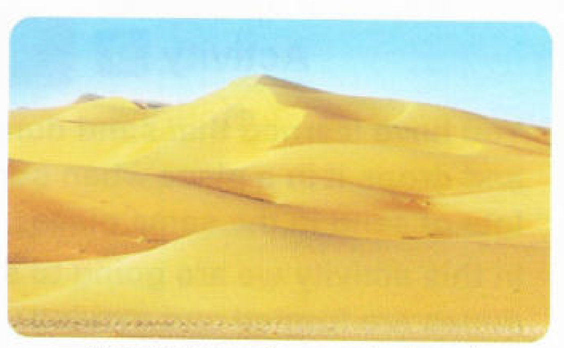
Sand dunes :

- Sand dunes are landforms which are made of windblown sand when something like rock blocks the wind.

Sand dunes in beach

blow	تهب	block	يمنع / يحتجز	sand dunes	الكثبان الرملية
picks up	يلتقط	flying sediment	الرواسب المتطايرة	windblown	هبوب الرياح
sand dunes	كثبان رملية	wears down	يتآكل		

- Sand dunes are common landforms between beach and sandy desert environments.
- Sand dunes usually seen in groups, and they may cover a large area.
- Sand dunes can be hundreds of meters tall.


Sand dunes in sandy desert

Sand dunes movement :

▶ **Sand dunes are continuously moving as follow :**

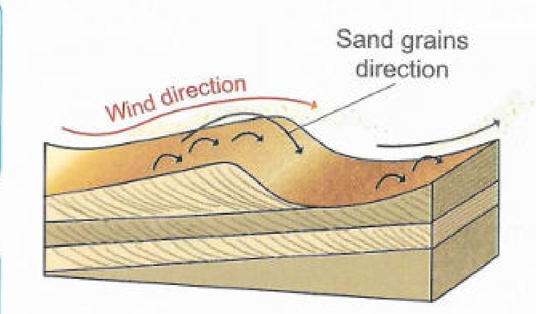
When wind blows across a dune, sand grains erode away from the side that wind is coming from.

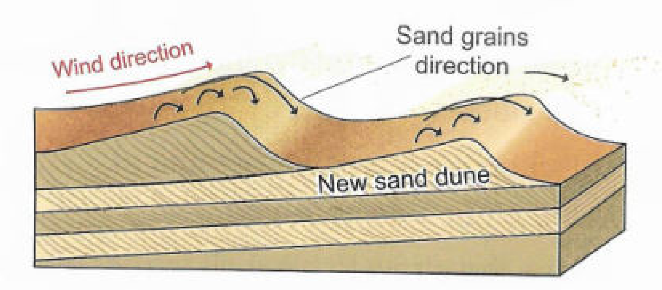
↓

The sand grains carried by the wind are collected along the slope of the dune.

↓

When the sand reach the top, the dune forms a barrier to the wind, and then the sand grains roll down the other side.





▶ **Generally, we can conclude that water and wind can change landscapes (such as canyons, mountains, dunes ... etc.) over time, where :**

- Running water can wear away the sides of a river or stream.
- Wind can break down rocks.



Check your understanding

▶ Complete the following sentences :

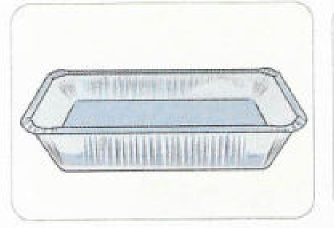
1. Sand dunes are formed by .... process and deposition process.
2. The common landforms between beach and sandy desert environments are ....

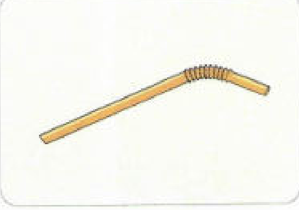
barrier	حاجز	sand grains	حبوب الرمل
continuously	باستمرار	sandy desert	صحراء رملية

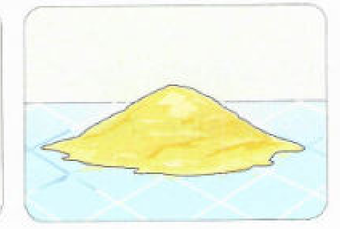
Activity 9 Sand Shifters

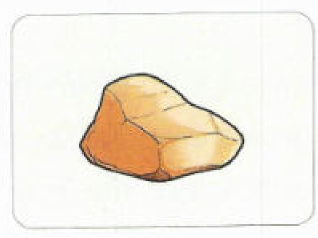
- **You have learned that sand dunes are formed when wind moves the sand and drops it in a place when something blocks the wind, then wind drops lots of sand in the same place.**
- **In this activity we are going to show by a simple experiment how sand dunes are formed and moving.**

Tools :


Aluminum foil pan


Straw


Sand


Small rock

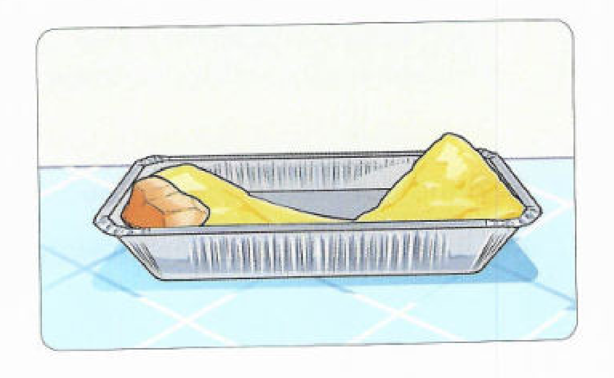
Steps :

1. Place a small rock in the pan at one of its sides.
2. Put suitable amount of sand at the other side of the pan.
3. Use the straw to blow air infront of the sand with a certain direction and small force, as shown in the figure.
4. Repeat the previous step with changing the direction and increasing the force of blowing.



Observations :

1. When blowing the air with a small force, sand travels a short distance, and by increasing the force of air blowing, sand travels a longer distance.
2. When the air blows at the same direction of the small rock, sand is blocked and collected infront of the rock.



aluminum foil pan	طبق من الألومنيوم	straw	ماصة
collected	يتجمع	blow	ينفخ

Conclusions :

1. The wind moves the sand, where :

- The distance that the sand travels depends on the force of the wind.
- The way that the sand moves depends on the direction of the wind.

2. The dunes are often formed when something blocks the path of sand, such as rocks.



Check your understanding

Choose the correct answer :

1. When the force of wind increases, the distance the sand travels ....

a. increases. b. doesn't change. c. decreases. d. stays constant.

2. The .... are formed when something block the path of wind carrying sand.

a. mountains b. valleys c. sand dunes d. rivers

In the Assessment Book :
Try to answer :
Self-Assessment (21)

Exercises on Lesson 4

● Understand ○ Apply ● Higher Thinking Skills

1 Choose the correct answer :

1. The process of carving the rock into different shapes by wind blowing is ....
   a. deposition. b. erosion. c. transportation. d. weathering.
2. Sand dunes are formed by the effect of both .... processes. *(Cairo 2023)*
   a. mechanical weathering and deposition
   b. erosion and weathering
   c. erosion and deposition
   d. chemical weathering and erosion
3. When the force of wind blowing ...., the sand travels for a longer distance.
   a. decreases b. becomes zero c. doesn't change d. increases
4. Formation of sand dunes depends on .... of the wind blowing.
   a. force only b. direction only
   c. both force and direction d. neither force nor direction
5. Sand dunes are common landforms between .... environments.
   a. beach and rainforest b. beach and sandy desert
   c. rainforest and sandy desert d. sandy desert and oceans
6. When a rock blocks the path of flying sand, a .... may be formed.
   a. dune b. river c. valley d. canyon
7. .... and .... affect the distance and the way of sand that travels through air. *(Ismailia 2023)*
   a. Wind force – sunlight b. Sunlight – wind direction
   c. Wind force – wind direction d. Sunlight – Earth's gravity

2 Put (✓) or (✗) :

1. Wind can pick up sand grains in forming sand dunes. *(Giza 2023)* (   )
2. Sand dunes are the landform that can be seen in both beach and sandy desert. (   )
3. Sand dunes are formed by erosion only. *(Minia 2023)* (   )
4. Sand travels for a short distance when wind blows with a great force. (   )
5. Sand dunes usually seen separatly, and may cover a small area. (   )
6. Wind cannot break down rocks. (   )

7. Mountains are formed when something block the path of wind carrying sand. ( )
8. Sand dunes are formed due to erosion and deposition processes caused by wind. ( )

3 Write the scientific term of each of the following :

1. It is the process by which the wind carves the rocks into different shapes. (....................)
2. It is the landform that is formed by erosion and deposition of sand in sandy desert environment. (....................)

4 Complete the following sentences by using the words below :

(direction – wind – rocks – decreases – hundreds)

1. Wind erosion can carve the .... into different forms.
2. Sand dunes are in continuous motion due to the movement of ....
3. When the force of wind .... , the sand can't travel for a long distance. *(Alex. 2023)*
4. Sand dunes may reach .... of meters tall.
5. Sand can move forward or backward depending on the .... of wind.

5 Give reasons for :

1. A sand dune may be formed in front a large rock in desert .

....

2. The distance that the sand travels depends on the force of the wind.

....

6 What happens if ...?

Wind that is carrying sand particles hits a big rock. *(Suez 2023)*

....

7 Arrange the following sentences to show the steps of how wind can erode a rock :

(........) Flying sediment hits the rock.

(........) Blowing of wind across a land.

(........) The sediment carves the rock into different shapes.

(........) Wind start to pick up sand and other rock particles and carries them away.

LESSON FIVE

Activity 10 Describing Landforms

▸ **In the previous lessons, you have learned about landforms and how they are formed.**

- Canyons and valleys are formed due to erosion by water and wind.
- Deltas are fan-shaped (triangular shape) landforms where river enter lakes, seas or oceans and they are formed due to deposition process.
- Sand dunes are formed due to erosion and deposition processes caused by wind.

Note
During a storm or a rockslide, erosion can happen quickly but in general, erosion happens slowly.



Check your understanding

▸ **Complete the following sentences using the words below :**

(deltas – canyons – sand dunes – slowly – rivers – wind – quickly)

1. .... are deep valleys with steep sides.
2. .... are fan-shaped landforms where rivers enter lakes or oceans.
3. .... are hills that are made of sand.
4. .... are often what causes the formation of both valleys and canyons.
5. .... and sand work together as forces of erosion in the desert.
6. During a storm or a rockslide, erosion can happen ....
7. In general, erosion happens ....

▸ **In the following table, write how each landform is caused by using the words below : [you can use the word more than once].**

(Water – Wind)

	Canyons and valleys	Deltas	Sand dunes
Causes :	....	....	....

Review on Concept (4.2)

To review this concept look at the **Assessment Book** "Part 2 : Final Revision".

In the Assessment Book :
Try to answer :
- Self-Assessment (22)
- Model Exam on Theme (4)
- Questions of the school book on Theme (4)

fan-shaped	على شكل المروحة	storm	عاصفة
triangular shape	مثلث الشكل	rockslide	إنزلاق صخري

Model Exam 
on Concept (4.2)

Total mark
___
15

1 (A) Choose the correct answer : *(5 marks)*

1. When a rock blocks the paths of flying sand, a .... may be formed.
   a. dune b. river c. valley d. canyon
2. A canyon may be formed due to the effect of ....
   a. erosion and deposition. b. weathering and erosion.
   c. weathering and deposition. d. deposition only.
3. Walls of canyons are characterized by all the following, except that they ....
   a. are very high. b. are gently sloped.
   c. have great depth. d. consist of many rocks layers.
4. The delta is formed when the river stream entering all of the following, except ....
   a. a lake. b. a sea. c. a mountain. d. an ocean.

(B) What happens if ... ?

A river erodes the sediments of a mountain over a long period of time.

....

2 (A) Put (✓) or (✗) : *(5 marks)*

1. Both canyons and valleys often have river in their bottom. (   )
2. Wadi Rum in Jordan is an example of dune. (   )
3. Sand dunes are formed by erosion only. (   )
4. Rivers cause less erosion of rocks than small streams. (   )

(B) Give a reason for the following :

Valleys have different shapes.

....

3 (A) Complete the following sentences by using the words below : *(5 marks)*

(wind – rocks – decreases – hundreds)

1. Wind erosion can carve the .... into different forms.
2. Sand dunes are in continuous motion due to the movement of ....
3. When the force of wind ...., the sand can't travel for a long distance.
4. Sand dunes may reach .... of meters tall.

(B) Look at the following pictures, then complete the sentences below :


A river
Picture (A)

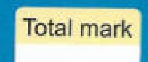

A valley
Picture (B)


A canyon
Picture (C)

1. If the water stream in picture .... is passed through a flat land for a short period of time, the landform in picture .... may be formed.
2. The landform in picture .... may be formed by the effect of wind and water erosion for a long period of time.
3. The landform in picture .... have gently sloped sides.

Model Exam 2

on Concept (4.2)



15

1 (A) Write the scientific term of each of the following : *(5 marks)*

1. It is a special type of valleys whose its sides are steep. (........................)
2. It is the process by which the wind carves the rocks into different shapes. (........................)
3. The two processes that have the main role in the formation of canyon. (........................)
4. They are lowland areas in between mountains and have gently sloped sides around rivers. (....................)

(B) Correct the underlined words :

1. Deltas are formed by <u>weathering</u> process. *(Minia 2023)* (........................)
2. Wadi Nakhr is an example of <u>valleys</u>. (........................)

2 (A) Complete the following sentences : *(5 marks)*

1. When the water of a river travels down a steep slope, its speed ....
2. Rainwater is pulled downhill forming small streams due to the effect of ....
3. Sand can move forward or backward depending on the .... of wind.
4. Sand dunes are formed by erosion process and .... process.

(B) What happens if ... ?

A river stream enters a sea.

....

....

3 (A) Put (✓) or (✗) : *(5 marks)*

1. A canyon may take one year only to be formed. (   )
2. The river movement can take the rocks away around mountains. (   )
3. Nile River Delta has a rectangular shape. (   )
4. Sand dunes usually seen separatly, and may cover a small area. (   )

(B) Arrange the following sentences to show the steps of how wind can erode a rock :

(........) Flying sediments hit the rock.

(........) Blowing of wind across a land.

(........) The sediments carve the rock into different shapes.

(........) Wind starts to pick up sand and other rock particles and carries them away.



SCIENCE

By A Group of Supervisors



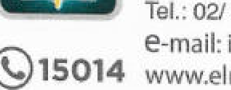








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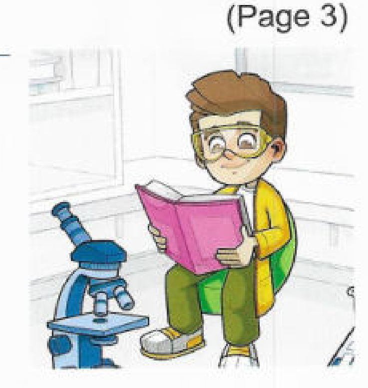


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This Assessment Book
Includes Four Parts

1 Part

Self-Assessments :
(Page 3)



Include :
- Cumulative self-assessments on lessons of each concept.
- Cumulative model exam on concepts.
- A model exam on each theme.
- Questions of the school book on each theme.

2 Part

Final Revision :
(Page 42)



Includes :

Review on each concept.

3 Part

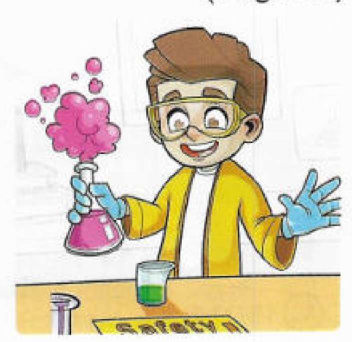
Final Examinations :
(Page 66)



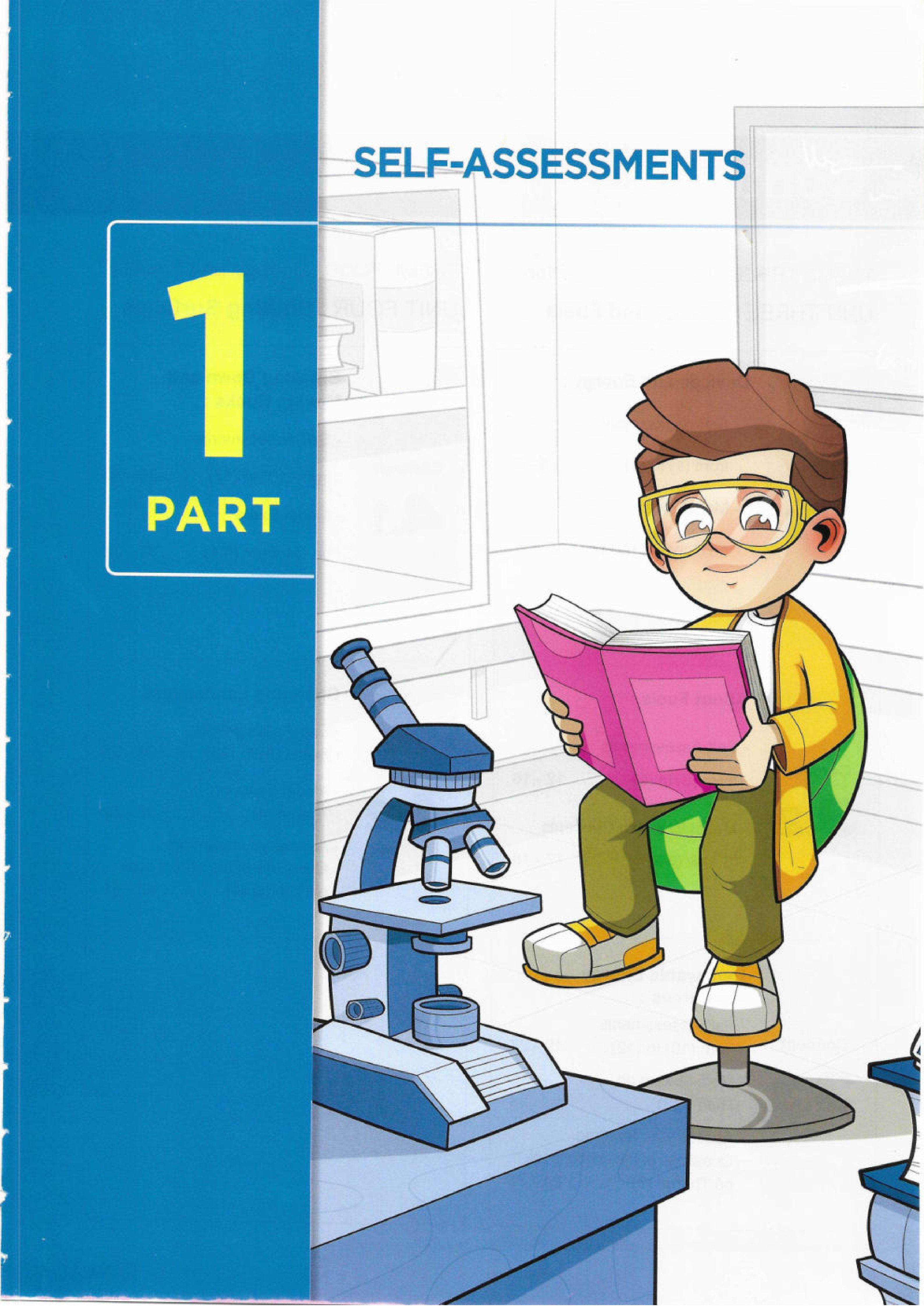
Include :
- El-Moasser final examination models.
- Final examinations of some governorates.

4 Part

Projects
(Page 97)



Include :
- Unit three project.
- Interdisciplinary project.
- Unit four project.



SELF-ASSESSMENTS

1 PART

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- Model Exam on Concept (3.1) .... 10 - 11

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Renewable Energy Resources :

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- Assess your learning. Questions of the school book on Theme (4) .... 40 - 41

Self-Assessments

on Concept (3.1)

Self-Assessment 1 On Lesson 1

1 **(A) Put (✓) or (✗) :**

1. The Mars rover Curiosity converts sound energy into kinetic energy. ( )
2. Mars rover Curiosity can be operated from a distance. ( )
3. The stored energy in batteries is the light energy. ( )

(B) Give a reason for the following :

Curiosity robot uses the sunlight and batteries for its operation.

....

....

2 **(A) Write the scientific term of each of the following :**

1. The energy produced from hand bell. (......................)
2. The form of energy that is stored in the battery of a remote controlled toy car. (......................)
3. The remote controlled vehicle used to explore the surface of planet Mars. (......................)

(B) Name two devices that can be operated from a distance by using a remote control.

....

....

3 **Look at the opposite figure, then choose the correct answer :**

1. This car needs .... to move.
   a. water b. wood
   c. fuel d. energy
2. To keep playing with the toy car when the battery runs out, we have to .... or recharge the battery.
   a. heat b. cool
   c. replace d. freeze
3. The form of energy that is used in operating this car is .... energy.
   a. sound b. light c. thermal d. electrical

Self-Assessment 2 till Lesson 2

1 (A) Complete the following sentences :

1. When you rub your hands together, the consumed energy is .... energy, while the produced energy is .... energy.
2. The produced energy in a toy car that causes its movement is .... energy, while the produced energies in a hair dryer are .... energy and sound energy.
3. The produced energy from coal when burned is .... energy, that is converted into .... energy used to operate the machines of electric power stations.

(B) Give a reason for the following :

The thermal energy produced from burning coal is used in some electric power stations.

....

....

2 (A) Put (✓) or (✗) :

1. Curiosity robot needs sound energy to be operated. ( )
2. The electric lamp is the primary source of most energies on the Earth. ( )
3. The washing machine converts electrical energy into kinetic energy. ( )

(B) What happens to ...?

The change of energy when you press on the spring of the soap dispenser.

....

....

3 Look at the opposite figure, then complete the following sentences :

1. This living organism can convert .... energy of the Sun into .... energy stored inside it.
2. If the wood of this organism is burned, ... energy is produced.
3. After death and burying of this organism over millions of years, it becomes coal that stores .... energy.
4. The formed coal can be used in electric power stations to generate .... energy.

Self-Assessment 3 till Lesson 3

1 (A) Choose the correct answer :

1. Mars rover Curiosity uses .... to be operated.
   a. solar energy and electrical energy
   b. solar energy and potential energy
   c. electrical energy and potential energy
   d. electrical energy and sound energy
2. While playing a drum, ... energy is converted into .... energy.
   a. sound – kinetic
   b. sound – light
   c. kinetic – sound
   d. kinetic – light
3. In a bicycle, a part of kinetic energy is converted into .... energy due to the friction of its tires with the road.
   a. sound b. thermal
   c. light d. chemical

(B) What happens to ... ?

The change of energy when you rub your hands together.

....

....

2 (A) Correct the underlined words :

1. Energy can neither be created nor destroyed, but only converted from one form to another, this is the law of <u>consuming</u> of energy. (........................)
2. The consumed energy while burning some pieces of wood is the <u>thermal</u> energy. (........................)
3. The lighted lamp produces <u>chemical</u> energy that makes you feel warmth when you put your hands near it. (........................)

(B) Mention two devices that convert electrical energy into both kinetic and sound energy.

....

....

3 **Look at the following figures, then complete the following sentences :**

Device (1) Device (2) Device (3) Device (4)

1. The electrical energy is used to operate devices number .... , ... and ....
2. Kinetic energy is produced in devices .... and .... to help them do their functions.

Self-Assessment 4 till Lesson 4

1 **(A) Complete the following sentences :**

1. The output energy of burning coal is .... energy, which is used to produce .... energy in electric power stations in order to generate electrical energy.
2. The output energy that helps the washing machine to do its main function is .... energy, and this energy is considered the .... energy of the hand bell.
3. The input energy of the toy car is .... energy that is stored in its battery and then converted into .... energy in its wires to operate its motor.

(B) Give a reason for the following :

Sound energy and thermal energy are considered as wasted energy in the vacuum cleaner.

....

....

2 **(A) Write the scientific term of each of the following :**

1. The input energy of a television. (........................)
2. The wasted energy in a computer when it is used for a long time. (........................)
3. The output energy of the washing machine which helps it do its main function. (........................)

(B) Mention the input and output energies of the opposite device :

1. Input energy : ....

2. Output energy : ....





Electric iron

3 Look at these electric devices, then complete the following sentences :





Device (1)



Device (2)



Device (3)

1. Sound and light energies are produced in the device number .... and help it do its function.
2. Kinetic energy is produced in devices number .... and ....
3. Noise from devices number .... and .... is wasted energy, because sound doesn't help the devices do their functions.
4. All of these devices are operated by .... energy that is transmitted from .... stations through wires.

Model Exam
on Concept (3.1)



1 **(A) Choose the correct answer :** *(5 marks)*

1. Mars rover Curiosity is designed to explore the ....
   a. planet Earth.   b. planet Mars.
   c. Sun.   d. moon.
2. Plants can convert the light energy from the Sun into .... energy which is stored inside the plant in the form of sugar.
   a. sound   b. electrical
   c. chemical   d. kinetic
3. When a piece of coal is burned, ... energy is produced.
   a. thermal   b. kinetic
   c. sound   d. potential
4. Inside a light bulb, electrical energy is converted into .... and .... energies.
   a. sound – light
   b. sound – thermal
   c. kinetic – light
   d. light – thermal

(B) What happens if ...?

You put your hands near a lighted lamp.

....

....

2 **(A) Put (✓) or (✗) :** *(5 marks)*

1. There is stored chemical energy inside the food we eat. (   )
2. The input energy in a hair dryer is the chemical energy. (   )
3. As a result of friction between bike's tires and the road, kinetic energy changes into chemical energy. (   )
4. We can convert the solar energy into different forms of energy. (   )

(B) Look at the following figures, then complete the following energy chain :

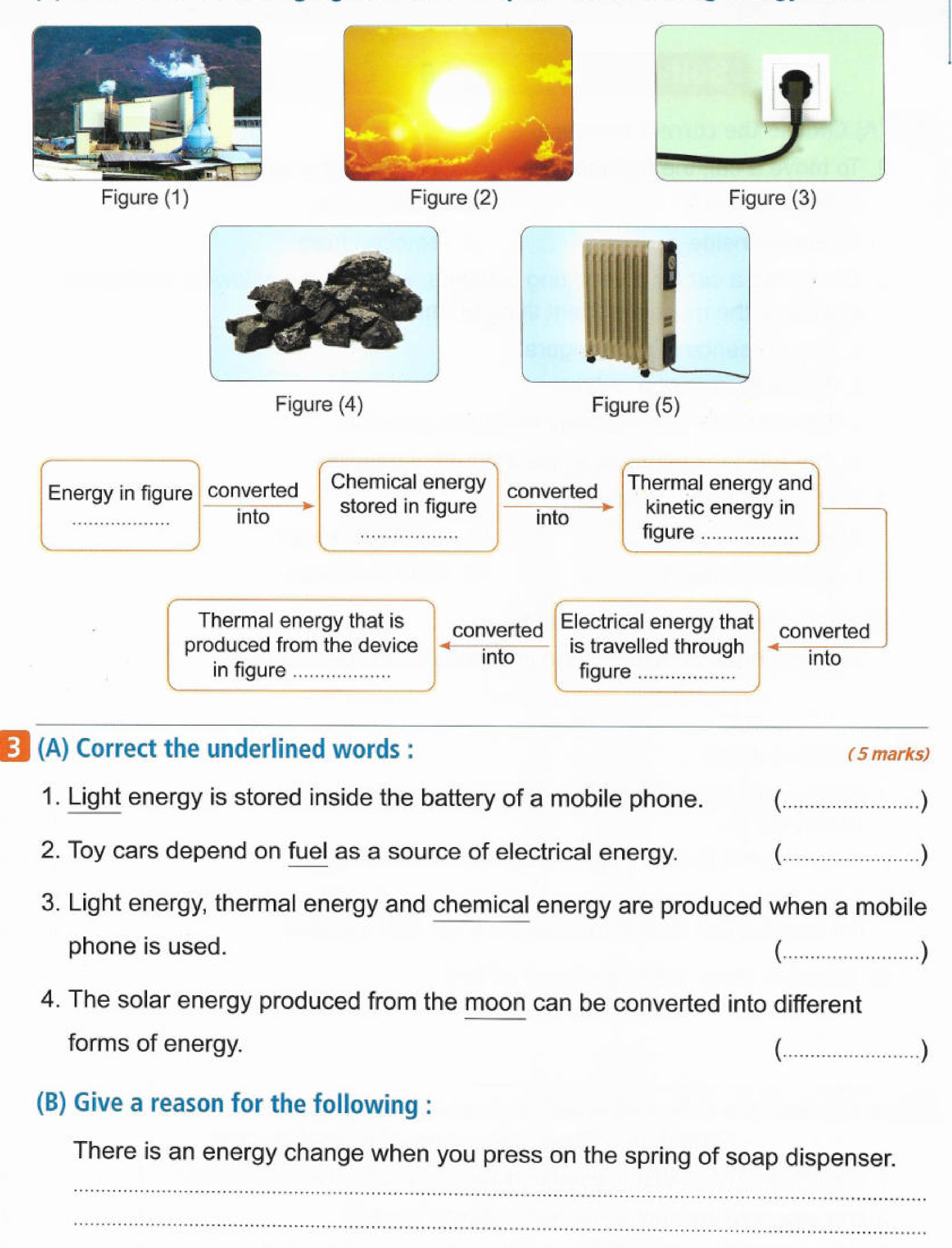


Figure (1) Figure (2) Figure (3)

Figure (4) Figure (5)

Energy in figure .... converted into → Chemical energy stored in figure .... converted into → Thermal energy and kinetic energy in figure .... converted into → Electrical energy that is travelled through figure .... converted into → Thermal energy that is produced from the device in figure ....

3 (A) Correct the underlined words :

(5 marks)

1. Light energy is stored inside the battery of a mobile phone. (..........................)
2. Toy cars depend on fuel as a source of electrical energy. (..........................)
3. Light energy, thermal energy and chemical energy are produced when a mobile phone is used. (..........................)
4. The solar energy produced from the moon can be converted into different forms of energy. (..........................)

(B) Give a reason for the following :

There is an energy change when you press on the spring of soap dispenser.

....

....

Self-Assessments

on Concept (3.2)

Self-Assessment 5 On Lesson 1

1 (A) Choose the correct answer :

1. To move a car, the fuel must be .... the car engine at first.
   a. freezed inside
   b. cooled inside
   c. burned inside
   d. removed from
2. On driving a car for a very long distance, which of the following sentences describes the most important thing for the driver ? ....
   a. The presence of passengers.
   b. The presence of a radio.
   c. The fuel tank is completely filled with gasoline.
   d. The fuel tank contains a little amount of gasoline.
3. On burning fuel, we obtain ....
   a. sound energy.
   b. potential energy.
   c. electrical energy.
   d. thermal energy.

(B) Give a reason for the following :

The importance of wood and coal as fuels in some houses.

....

2 (A) Put (✓) or (✗) :

1. Energy that is produced from burning gasoline, cannot be used to move a car. (   )
2. Burning of all forms of fuel produces thermal energy. (   )
3. If the fuel in a car decreases during driving, the driver must stop at the nearest fuel station to supply the car with gasoline. (   )

(B) Mention three different forms of fuel.

....

....

3 Put each of the following words in front of the suitable sentence :

[The Sun – Wood – Gasoline – Thermal energy]

1. It is a form of fuel that is used in different means of transportation. (........................)
2. It is a form of fuel that is used in warming houses. (........................)
3. It is a form of energy which is produced from burning fuel. (........................)
4. The main source of most energies on the Earth's surface. (........................)

Self-Assessment 6 till Lesson 2

1 (A) Choose the correct answer :

1. Car engines can be operated by ....
   a. coal only. b. coal and wood.
   c. gasoline only. d. gasoline and natural gas.
2. Fossil fuels were formed under the Earth's surface from dead plants or animals, after a .... period of time.
   a. very short b. short c. very long d. long
3. The two main types of fuel are ....
   a. wood and coal. b. water and wind.
   c. the Sun and the moon. d. fossil fuels and biofuels.

(B) Give a reason for the following :

Biofuel is considered as a renewable fuel.

....

2 (A) Put (✓) or (✗) :

1. Coal can be used to produce electrical energy. ( )
2. Coal, gasoline and wood are considered as renewable resources of energy. ( )
3. The nonrenewable resources of energy include coal, gasoline and water. ( )

(B) What happens if ... ?

Sea creatures were buried under the Earth's surface over millions of years.

....

3 Choose from column (B) what suits it in column (A) :

(A) Form of fuel	(B) We can get it from
1. Wood	a. wood chips and grass.
2. Oil	b. cutting of trees.
3. Coal	c. decomposition of sea creatures underground.
4. Liquid biofuels	d. decomposition of plants remains underground.
	e. boiling water.

1. .... 2. .... 3. .... 4. ....

Self-Assessment 7 till Lesson 3

1 (A) Choose the correct answer :

1. To produce steam inside the electric power station, we have to ....
   a. cool water. b. freeze water.
   c. heat water. d. cool fuel.
2. The devices in the electric power station which operated by steam are called ....
   a. generators. b. turbines.
   c. tubes. d. wires.
3. The generator inside the electric power station, turns ....
   a. water into steam. b. steam into water.
   c. electrical energy into kinetic energy.
   d. kinetic energy into electrical energy.

(B) What happens if ...?

A generator in an electric power station is damaged.

....

2 (A) Put (✓) or (✗) :

1. When fuel is burned, it produces thermal energy. ( )
2. Turbines convert kinetic energy into electrical energy. ( )
3. The electrical energy produced from electric power station can be used in houses, streets and factories. ( )

(B) Complete the following sentences by choosing the correct answer from those between brackets :

1. Fossil fuels are [nonrenewable – renewable] resources of energy which can be used to generate electrical energy.
2. Turbines in electric power stations are operated by the effect of [steam – sand].
3. Electrical energy travels from electric power stations to houses through [cars – wires].

3 From your understanding of how electricity is generated in electric power stations. Put each of the following words in front of its suitable sentence :

[Coal – Steam – Turbine – Generator]

1. Its movement produces kinetic energy. (........................)
2. It changes kinetic energy into electrical energy. (........................)
3. It is a type of nonrenewable resources of energy. (........................)
4. It is resulted from heating the water and it turns turbines. (........................)

Self-Assessment 8 till Lesson 4

1 (A) Choose the correct answer :

1. When carbon dioxide gas increases in air, the Earth's temperature ....
   a. decreases slowly. b. increases slowly.
   c. decreases fastly. d. doesn't change.
2. All forms of fossil fuel are formed ....
   a. above the Earth's surface. b. under the Earth's surface.
   c. above the water surface. d. in the air around us.
3. We have to protect rocks of buildings from ....
   a. global warming. b. oxygen gas.
   c. acid rain. d. carbon dioxide gas.

(B) Give a reason for the following :

Burning of coal and oil causes the increase of the Earth's temperature.

....

....

2 (A) Put (✓) or (✗) :

1. Acid rain causes global warming. ( )
2. Burning of fossil fuels produces gases that don't cause global warming. ( )
3. Acid rains have negative effects on both soil and water of lakes. ( )

(B) What happens to ...?

The Earth's temperature if the amount of gases produced from burning of fossil fuels increases to very high limit.

....

3 Scientists do some experiments to know the bad effects of some different sources of pollution on living organisms.

Match each experiment with its correct observation :

The experiment	The observation
1. Exposing a dog to cars smog for a few minutes	a. its leaves turn brown and it will die.
2. Placing a building rock in a cup contains a sample of acid rain for a long period of time	b. irritation of its eyes and lungs.
3. Watering a small plant with acid rain for a week	c. it will decompose into small rocky particles.

1. .... 2. .... 3. ....

Self-Assessment 9 till Lesson 5

1 (A) Choose the correct answer :

1. The energy that originally causes the formation of fuels is ....
   a. wind energy.
   b. water energy.
   c. solar energy.
   d. electrical energy.
2. As the time passes, the amount of coal will ....
   a. increase.
   b. decrease.
   c. remain constant.
   d. increase then decrease.
3. Burning of fossil fuels produces ....
   a. only gases that pollute the air.
   b. only thermal energy.
   c. gases that pollute the air and solar energy.
   d. thermal energy and gases that pollute the air.

(B) Give a reason for the following :

Burning fossil fuels causes global warming.

....

2 (A) Put (✓) or (✗) :

1. Renewable forms of fuel can be replaced faster than nonrenewable forms of fuel. ( )
2. Mixing of water with oxygen gas produces acid rain. ( )
3. Burning coal releases gases which cause air pollution. ( )

(B) What happens to ...?

The people's health if they live in a city that has too much cars smog.

....

3 Complete the following paragraph by using the following words :

[global warming – heat – raises – gases]

From the disadvantages of using fossil fuels is that when they are burned, they release .... that cause air pollution and trap .... in the atmosphere, which .... the temperature on the Earth, that causes .... and changes the Earth's climate.

Model Exam

on Concepts (3.1) & (3.2)

Total mark



1 (A) Choose the correct answer :

(5 marks)

1. A form of biofuels which can be used in warming houses and cooking food is ....
   a. wood.
   b. wind.
   c. water.
   d. sand.

2. You feel warm when you rub your hands together, because .... energy converts into thermal energy.
   a. kinetic
   b. light
   c. electrical
   d. sound

3. All the following are from the harmful effects of acid rain, except ....
   a. the death of trees.
   b. the change in the chemical nature of soil.
   c. the increase in the Earth's temperature.
   d. the change in the chemical nature of lakes.

4. A form of fossil fuels that was formed from the decomposition of plant remains is ....
   a. wind.
   b. coal.
   c. wood.
   d. sand.

(B) Give a reason for the following :

A remote controlled toy car needs a battery to move from one place to another.

....

....

2 (A) Put (✓) or (✗) :

(5 marks)

1. Grass and wood chips can be used to make a liquid fuel. (   )
2. When pedalling a bike, the chemical energy in your body changes into kinetic energy. (   )
3. The movement of a turbine in the electric power station produces chemical energy. (   )
4. Energy may be destroyed inside different devices. (   )

(B) What happens if ...?

Pesticides mix with water of canals and rivers.

....

3 **(A) Complete the following sentences :** *(5 marks)*

1. The change of electrical energy into sound energy in the radio is an example that proves the law of ....
2. The generator in the electric power station changes .... energy into electrical energy.
3. In any energy chain, some of the energy is wasted in the form of ....
4. Curiosity is a robotic vehicle that is designed to explore the surface of ....

(B) Write the scientific term of each of the following :

1. The main source of most forms of energy on the Earth's surface. (......................)
2. The energy resources that include wind energy, water and solar energy. (......................)

Self-Assessments
on Concept (3.3)

Self-Assessment 10 On Lesson 1

1 **(A) Choose the correct answer :**

1. The solar panels use solar energy to generate .... energy that is used to light up lamps of light posts in streets.
   a. thermal b. kinetic
   c. electrical d. light
2. All the following are considered as nonrenewable energy resources, except ....
   a. coal. b. wind.
   c. natural gas. d. petroleum.
3. Wind turbines generate electricity that can be used to operate all the following devices, except ....
   a. television. b. electric blender.
   c. hair dryer. d. hand bell.

(B) Give a reason for the following :

Modern water turbines are connected to generators.

....

....

2 **(A) Put (✓) or (✗) :**

1. Wind and water are considered as nonrenewable energy resources. ( )
2. Water is used to operate wind turbines to generate electricity. ( )
3. Hundreds of years ago, people used windmills to crush grain to make flour. ( )

(B) What happens if ...?

Radiant energy that comes out of the Sun enters the greenhouses.

....

....

3 **Look at the opposite picture, then complete the following sentences :**

1. The name of this glass building is ....
2. The idea of working of this glass building depends on collecting the .... energy coming from the Sun.
3. The received energy is converted into .... energy that warms the inside of this building.
4. In the cold regions, this building allows farmers to plant crops that only grow in .... climates.

Self-Assessment 11 till Lesson 2

1 **(A) Complete the following sentences :**

1. Radiant energy is used to generate electricity directly by using .... , or indirectly as it causes blowing of .... that is used to rotate wind turbines.
2. A wind turbine spins faster when the kinetic energy of .... increases.
3. The energies that are produced from modern wind turbines and old windmills are considered as .... energy resources.

(B) Give a reason for the following :

Some electrical devices have solar panels.

....

....

2 **(A) Put (✓) or (✗) :**

1. Solar panels are used to generate sound energy in some types of street lamps. (   )
2. When the kinetic energy of wind that is applied to the wind turbines increases, they produce more electricity. (   )
3. Both solar panels and natural gas are renewable energy resources. (   )

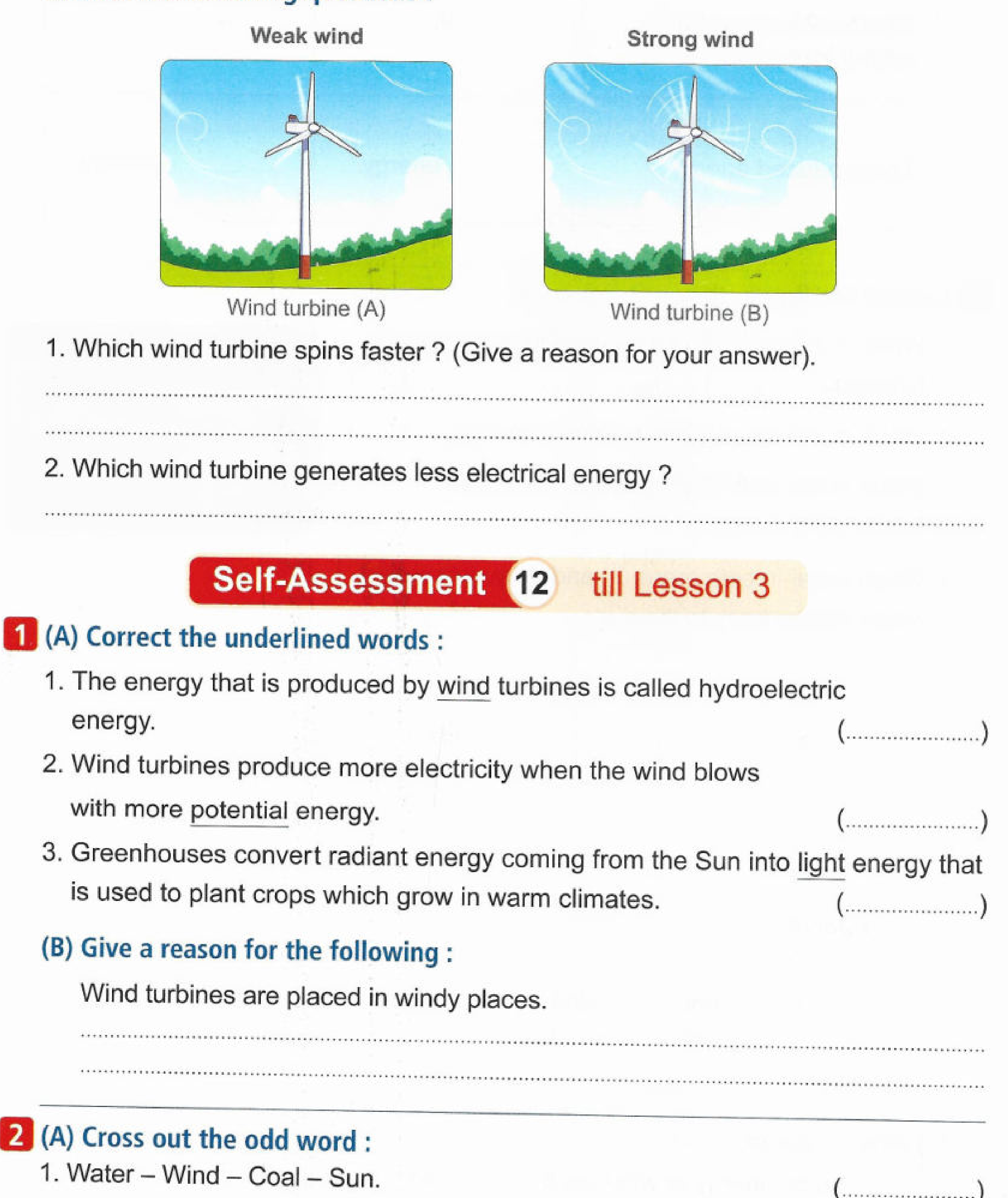
(B) What happens if ...?

The kinetic energy of wind applied to the wind turbines decreases.

....

....

3 **If the two wind turbines in front of you are affected by the different wind forces. Answer the following questions :**



Wind turbine (A) Wind turbine (B)

1. Which wind turbine spins faster ? (Give a reason for your answer).

....

....

2. Which wind turbine generates less electrical energy ?

....

Self-Assessment 12 till Lesson 3

1 **(A) Correct the underlined words :**

1. The energy that is produced by <u>wind</u> turbines is called hydroelectric energy. (........................)
2. Wind turbines produce more electricity when the wind blows with more <u>potential</u> energy. (........................)
3. Greenhouses convert radiant energy coming from the Sun into <u>light</u> energy that is used to plant crops which grow in warm climates. (........................)

(B) Give a reason for the following :

Wind turbines are placed in windy places.

....

....

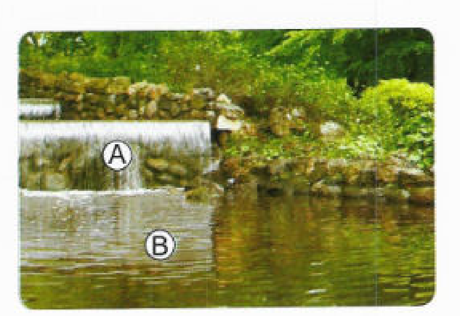
2 **(A) Cross out the odd word :**

1. Water – Wind – Coal – Sun. (........................)
2. Solar water heater – Hand mixer – Solar panel – Greenhouse. (........................)
3. Gasoline – Coal – Natural gas – Wind. (........................)

(B) Compare between water turbines and solar panels in the table below :

Points of comparison	Water turbines	Solar panels
1. Source of energy that is used to operate it :	....	....
2. The produced energy :	.... energy.	.... energy.

3 Look at the figure, then put (✓) or (✗) :

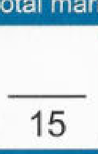


1. Water in the area Ⓐ can be used in rotating water turbines. (   )
2. Water in the area Ⓐ has no kinetic energy. (   )
3. Water in the area Ⓑ may evaporate in the presence of sunlight. (   )
4. When water in both areas Ⓐ and Ⓑ evaporates, it never returns back to the river. (   )

Model Exam

on Theme (3)

Total mark



1 (A) Complete the following sentences : *(5 marks)*

1. Remote controlled toy car changes .... energy stored in its batteries into .... energy that in turn changes into .... energy which is used to move the car.
2. When you rub your hands together, the .... energy is converted into .... energy.
3. Coal, ... and .... can be used in generating electricity.
4. Wind turbines and windmills use the energy of .... to be powered.

(B) Mention one use for the following :

Water turbines.

....

....

2 (A) Put (✓) or (✗) : *(5 marks)*

1. We have to reduce the usage of the Sun as a source of energy. ( )
2. As a result of global warming, the temperature on the Earth increases. ( )
3. Both wind movement and water flow have kinetic energy. ( )
4. In the soap dispenser, potential energy changes into kinetic energy. ( )

(B) Give a reason for the following :

The importance of generators in electric power stations.

....

....

3 (A) Write the scientific term of each of the following : *(5 marks)*

1. A panel designed to absorb sunlight to generate electricity. (........................)
2. It is any substance which produces thermal energy on burning. (........................)
3. A robotic vehicle which is designed to explore the surface of Mars. (........................)
4. The energy used when playing a drum. (........................)

(B) What happens to ... ?

The car movement when the fuel runs out.

....

....

Assess your Learning

Questions of the School Book on Theme (3)

• **Choose the correct answer :**

1. Energy doesn't destroy, nor create from nothing, this indicates ....
   a. the draining of energy resources.
   b. conservation and transformation of energy.
   c. resources of energy are numerous.
   d. destroying the energy resources.
2. The produced energy from radio that reflects its main function is .... energy.
   a. electrical b. sound
   c. light d. chemical
3. The idea of design and work of the robot that explores the surface of Mars depends on the idea of transforming ....
   a. electrical energy to kinetic energy.
   b. potential energy to kinetic energy.
   c. light energy to electrical energy.
   d. kinetic energy to electrical energy.
4. In our daily life we use devices which depend on energy forms. Which of the following uses is true ? ....
   a. Computer depends on kinetic and electrical energy.
   b. Ceiling fan depends on electrical energy.
   c. The function of television depends only on the hydroelectric energy.
   d. Cell phones depend on potential and kinetic energy for operation.
5. Which of the following energy forms isn't produced from the Sun ? ....
   a. Thermal energy. b. Light energy.
   c. Kinetic energy. d. Radiation energy.
6. **Rearrange the following steps to describe how coal is formed.**
   a. The Earth surface plants got old and died. (........)
   b. The remains of the plants were decomposed and covered with sand and clay layers. (........)
   c. Anciently, Earth was containing with swamps where plants grow. (........)
   d. Several layers of clays and sands were deposited on the remains of dead plants. (........)
   e. The buried plants were changed into coal due to the effect of heat and pressure. (........)

• Choose the correct answer :

7. Which of the following is a preferred natural resource to generate clean energy ? ....
   a. Ocean and river water.
   b. Trees and dry herbs.
   c. Water, coal, and oil.
   d. Coal and natural gas.

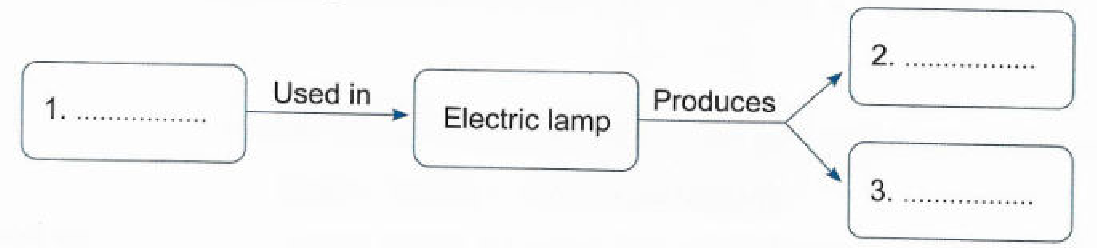
8. .... are used in converting light energy to electrical energy.
   a. Wind turbines
   b. Water turbines
   c. Solar panels
   d. Windmills

9. .... is a renewable source of energy.
   a. Coal
   b. Natural gas
   c. Water
   d. Fossil fuel

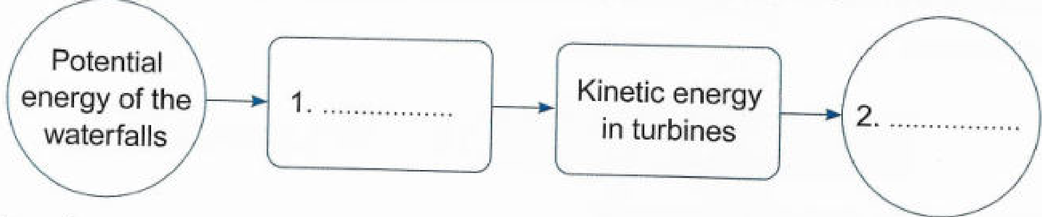
10. The produced energy from flowing water of waterfalls and dams and operating turbines is called ....
    a. mechanical energy.
    b. hydroelectric energy.
    c. chemical energy.
    d. kinetic energy.

11. .... is considered one of the resources that we consume at a faster rate than it is formed.
    a. Wind
    b. Water
    c. Solar energy
    d. Fossil fuel

12. **Complete the following model :**



13. **Complete the following model to describe the hydroelectric energy, and then determine the input and output energies of this system ?**



3. Input energy : ....
4. Output energy : ....

Self-Assessments
on Concept (4.1)

Self-Assessment 13 On Lesson 1

1 (A) Correct the underlined words :

1. The deep valley that is carved by flowing water, is known as coastal rock. (......................)
2. Disappearance of a sandcastle in few minutes is an example of slow changes. (......................)
3. Canyons are formed due to fast changes. (......................)

(B) Cross out the odd word :

Formation of canyons – Formation of valleys – Disappearance of a sandcastle – Breaking down of costal rocks. (......................)

---

2 (A) Put (✓) or (✗) :

1. Both of sandcastles and canyons can be formed in few hours. (   )
2. There are some similarities between sandcastles and coastal rocks. (   )
3. Canyons have sloping at sides like that of coastal rocks. (   )

(B) Give a reason for the following :

Sandcastle on a seashore may disappear in few minutes.

....

---

3 Complete the following sentences using the words below :

(minutes – slow – years – fast)

1. Formation of coastal rocks and canyons takes many .... , so this is considered as .... changes.
2. Disappearance of sandcastle on a seashore takes few .... , so this is considered as .... changes.

Self-Assessment 14 till Lesson 2

1 (A) Correct the underlined words :

1. The movement of sediments from one place to another, is know as deposition. (......................)
2. Weather is the breaking down of rocks on Earth's surface into tiny pieces. (......................)
3. Plant leaves grow inside the cracks of rocks which become wider. (......................)

(B) What happens if ... ?

Water in cracks of rocks freeze and melt several time.

....

....

2 (A) Put (✓) or (✗) :

1. Water may cause mechanical and chemical weathering. (   )
2. Chemical weathering could occur due to the acid that is produced from lichens or present in some rains. (   )
3. Limestone caves are formed due to friction between sand and rocks. (   )

(B) Give a reason for the following :

Plant roots play an important role in mechanical weathering.

....

....

3 Classify the following examples in the table below :

1. Rusting of an iron statue.
2. Formation of limestone cave.
3. Break down of rocks by plant roots.
4. Break down of a rock statue by wind.
5. Break down of rocks by acid rain.
6. Dissolving minerals of rocks by acids of lichens.

Mechanical weathering	Chemical weathering
....	....
....	....
....	....
....	....
....	....
....	....

Self-Assessment 15 till Lesson 3

1 (A) Put (✓) or (✗) :

1. Crushing a piece of biscuit by hands can represent a type of chemical weathering. ( )
2. The shape and structure of an iron statue are changed due to rusting process. ( )
3. Limestone caves formed withen few hours. ( )

(B) Give a reason for the following :

Dissolving biscuits in water containing antacid considered as a chemical weathering.

....

2 (A) Complete the following sentences using the words below :

(water – chemical – weathering – mechanical)

1. The .... weathering makes greater changes than .... weathering.
2. Chemical and mechanical weathering can be caused by ....
3. If the color of a statue changes and it is broken into small pieces, this means both types of .... process are happened to it.

(B) What happens if ...?

A piece of cookies is placed in a cup of water containing antacid.

....

3 Classify the following factors that causing weathering in the table below :

1. Wind.
2. Water.
3. Acids.
4. Temperature.
5. Plant roots.
6. Oxygen gas.

Factors cause mechanical weathering	Factors cause chemical weathering
....	....
....	....
....	....
....	....
....	....

Self-Assessment 16 till Lesson 4

1 (A) Correct the underlined words :

1. Weathering process followed by deposition process in reshaping Earth's surface. (........................)
2. Sand grains can be carried for a short distance by strong wind. (........................)
3. When sediments are deposited at the end of a river, a sand dune is formed. (........................)

(B) Cross out the odd word :

Limestone caves – Red rusts in iron rocks – Freezing of water inside rock cracks – Breaking down of rocks by the effect of acid rains. (........................)

2 (A) Put (✓) or (✗) :

1. You can see the reshaping of Earth's surface during its occurance. ( )
2. If there is no erosion process, there is no deposition process in another place. ( )
3. Delta may be formed by the effect of weathering process only. ( )

(B) What happens if ...?

The gravity acts on broken weathered rocks at the top of a mountain.

....

....

3 Study the following two figures of sand grains, then put (✓) or (✗) below :

Figure (1)

Figure (2)

1. The action of water erosion appears in figure (1). ( )
2. Gentle wind causes the deposition of sand grains in figure (1). ( )
3. Both figures (1) and (2) show sand dunes that are formed as a result of wind deposition. ( )

Self-Assessment 17 till Lesson 5

1 **(A) Correct the underlined words :**

1. Hills of sand which are found in deserts and seashores are known as canyons. (.........................)
2. Erosion process means that wind or water break down rocks. (.........................)
3. Erosion process is usually followed by weathering process. (.........................)

(B) Give a reason for the following :

If there is no erosion process there is no deposition process in another place.

....

....

2 **(A) Put (✓) or (✗) :**

1. After deposition of eroded materials it may wear down again by wind or water. (   )
2. Erosion and deposition are two linked processes. (   )
3. Both of small sand dunes and costal rocks need few days to be formed. (   )

(B) What happens if ... ?

Weathering process doesn't occur.

....

....

3 **Study the following two figures, then put (✓) or (✗) below :**

Figure (1)

Figure (2)

1. Figure (1) represents a triangle-shaped delta. (   )
2. Figures (2) occurs due to the deposition of sediments and mud in a desert. (   )
3. Formation of figure (1) takes longer time than formation of figure (2). (   )
4. Water erosion play an important role in formation of sand dunes that present in figure (2). (   )

Model Exam
on Concept (4.1)

Total mark

—
15

1 **(A) Write the scientific term of each of the following :** *(5 marks)*

1. The disappearance of a sandcastle as a result of its hitting with the sea waves. (......................)
2. It is a type of caves that is formed when dissolved minerals of rocks combine again in new shapes. (......................)
3. Process in which the moving sediments are dropped in a new place. (......................)
4. A hill of sand created by the wind. (......................)

(B) What happens if ...?

A red-colored rust is formed on some rocks.

....

....

2 **(A) Choose the correct answer :** *(5 marks)*

1. As a result of breaking down of .... , sand is formed.
   a. rubber b. plastic c. rocks d. glass
2. The breaking of rocks into smaller particles without changing their properties is called ....
   a. mechanical weathering. b. chemical weathering.
   c. deposition. d. erosion.
3. The deep narrow valley with slopes at its sides and often with water stream flowing through it is known as a ....
   a. canyon. b. mountain. c. hill. d. river.
4. Lichens produce .... on rocks that dissolve minerals found in these rocks.
   a. oxygen b. acids c. water d. rain

(B) Give a reason for the following :

Water play an important role in the formation of limestone caves.

....

....

3 (A) Complete the following sentences using the words below : *(5 marks)*

(chemical – mechanical – wind – weathering)

1. During .... process, rocks are broken down or weared away.
2. Formation of limestone caves is an example of .... weathering.
3. Air moving from an area to another and has a role in breaking down of rocks into smaller particles is known as ....
4. There are two types of weathering which are .... weathering and chemical weathering.

(B) Correct the underlined words :

1. The dropping of sediments in a new place, is known as weathering. (........................)
2. Small sand dunes are formed due to strong winds. (........................)

Self-Assessments

on Concept (4.2)

Self-Assessment 18 On Lesson 1

1 (A) Choose the correct answer :

1. .... has brown and black colors.
   - a. The Small Canyon
   - b. Wadi Nakhr
   - c. The Colored Canyon
   - d. Wadi Rum
2. .... are formed by the effect of water stream.
   - a. Mountains
   - b. Dunes
   - c. Hills
   - d. Canyons
3. Rivers can make new lands from sediments by the effect of .... process.
   - a. mechanical weathering
   - b. chemical weathering
   - c. deposition
   - d. erosion

(B) Give a reason for the following :

The sides of a canyon at the beginning of its formation are gently sloped.

....

2 (A) Put (✓) or (✗) :

1. The Colored Canyon in Sinai is formed due to erosion by water for a short period of time. (   )
2. There are no trees or plants grow on the both sides of a canyon at the beginning of its formation. (   )
3. The walls of canyons may be eroded by the effect of a river movement. (   )

(B) What happens if ...?

More of rain water is running through a small canyon again.

....

3 Look at the following pictures, then complete the sentences below :


Picture (A)


Picture (B)

1. Rains in picture .... can turn the flat land into the landform that is present in picture ....

2. If a lot of rain falls on the landform in picture .... , its gently sloped sides will get deeper.
3. Water in picture .... can gather in one stream and form a river.
4. Landform in picture .... is considered as a small canyon at the beginning of its formation.

Self-Assessment 19 till Lesson 2

1 (A) Complete the following sentences using the words below :

(type – Sinai – V-shape)

1. Wadi Rum in Jordan has a ....
2. The Colored Canyon is found in ....
3. The shape of valley depends on the .... of rocks exist in the landscape.

(B) Give a reason for the following :

People must not build their houses very close to a river.

....

2 (A) Put (✓) or (✗) :

1. Big streams cause more erosion than small streams. ( )
2. All canyons have the same shape. ( )
3. Canyons differ in colors and texture of rocks. ( )

(B) What happens if ...?

A water stream flows over a flat land for many days.

....

3 Choose from column (B) what suits it in column (A) :

(A) Processes	(B) Evidence
1. Weathering. 2. Erosion. 3. Deposition.	a. Formation of a patch of sand after heavy rain. b. Formation of clouds in the sky. c. Formation of small canyon where soil is washed away after heavy rain. d. Formation of rounded and worn small rocks.

1. .... 2. .... 3. ....

Self-Assessment 20 till Lesson 3

1 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Deltas 2. Valley 3. Canyon	a. is a special type of valleys that has steep sides. b. are formed due to the effect of deposition process. c. is a lowland area in between mountains and has gently sloped sides. d. are formed due to the effect of weathering process.

1. .... 2. .... 3. ....

(B) Give a reason for the following :

Canyons may be formed as a result of river streaming.

....

2 (A) Correct the underlined words :

1. Canyons can take hundreds of years to be formed. (.........................)
2. Big streams cause more deposition than small streams. (.........................)
3. Nile River Delta has a rectangular shape. (.........................)

(B) What happens if ...?

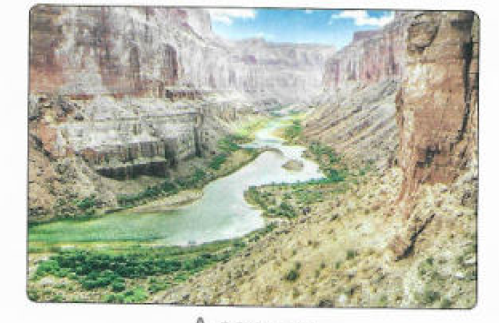
The fast flow of water eroded a lot of sediments of a mountain and carried them away for a long period of time.

....

3 Look at the following pictures, then choose the correct answer :



A valley
Picture (A)



A canyon
Picture (B)

1. The landform that have gently sloped sides is present in .... (Picture (A) – Picture (B))
2. The landform that were eroded in mountains is present in .... (Picture (A) – Picture (B))
3. Both landforms are created by the effect of .... processes. (weathering and erosion – erosion and deposition)

Self-Assessment 21 till Lesson 4

1 (A) Choose the correct answer :

1. Nile River Delta is formed due to .... process.
   a. chemical weathering
   b. mechanical weathering
   c. erosion
   d. deposition
2. Most .... are formed by the effect of water erosion of many sediments and transferring them away.
   a. deltas
   b. mountains
   c. valleys
   d. dunes
3. Among the landforms that depend on deposition process in their formation are ....
   a. sand dunes and deltas.
   b. canyons and deltas.
   c. sand dunes and valleys.
   d. deltas and valleys.

(B) Give a reason for the following :

Plants that grow in the wetlands of deltas have an important role in formation of those deltas.

....

....

2 (A) Correct the underlined words :

1. Deltas are formed by weathering process. (..........................)
2. Dunes are lowland areas which have gently sloped sides. (..........................)
3. Small canyon is formed due to the flowing of wind through the flat land. (..........................)

(B) What happens if ... ?

The speed of the river water decreases.

....

....

3 Look at the opposite figures, then answer the question below :

Do you think that a delta will form in the area Ⓐ ?
(Give a reason for your answer)

....

....

Self-Assessment 22 till Lesson 5

1 (A) Complete the following sentences using the words below :

(decreases – erosion – increases)

1. Wind in desert can change the shape of rocks by .... process.
2. When a river meets a sea, the speed of river's water .... and may cause formation of a delta.
3. When the amount of rainwater .... , the sides of the canyon may get deeper.

(B) Give a reason for the following :

Sometimes we can observe sand dunes in front of large rocks of desert.

....

2 (A) Put (✓) or (✗) :

1. Dunes are special type of valleys which is formed due to wind erosion. ( )
2. Deltas may contain fertile soil which is suitable for cultivating many crops. ( )
3. Canyons are formed by weathering and erosion of rocks for a long period of time. ( )

(B) What happens to ...?

The sand in a desert when wind blows by a great force.

....

3 Complete the sentences below pictures to show how these landforms are formed by writing "Weathering process, Erosion process or Deposition process" :



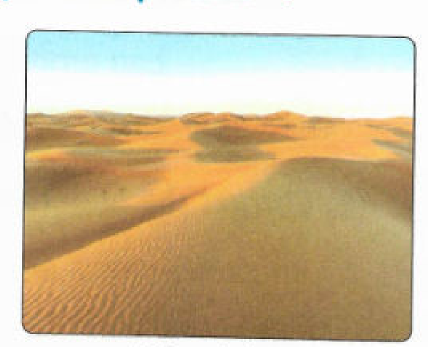
A Canyon

1. .... and .... processes.



A Delta

2. .... process.



A Sand dune

3. .... and .... processes.

Model Exam

on Theme (4)

Total mark



1 **(A) Put (✓) or (✗) :** *(5 marks)*

1. A small canyon could be formed due to the effect of water stream on a flat land. ( )
2. Wind can be considered one of the factors that cause weathering. ( )
3. The walls of valleys are vertical and steep. ( )
4. The force of gravity pulls rocks down the mountain sides causing its erosion. ( )

(B) Give a reason for the following :

People must not build their houses very close to a river.

....

....

---

2 **(A) Choose the correct answer :** *(5 marks)*

1. A canyon may take .... of years to be formed.
   a. hundreds b. tens c. millions d. couple
2. All the following are processes that can change the Earth's surface, except ....
   a. digestion. b. erosion. c. weathering. d. deposition.
3. A gentle wind may carry sand for a .... distance, but the hurricane can carry sand for a .... distance.
   a. long – shorter b. long – longer
   c. short – shorter d. short – longer
4. .... can erode valleys and make canyons across them.
   a. Rivers b. Mountains c. Dunes d. Rocks

(B) Correct the underlined words :

1. Limestone caves are formed due to the combination of red-colored rust. (..........................)
2. When the water of a river travels down hill on a steep slope, its speed will decrease. (..........................)

3 (A) Complete the following sentences by using the words below : *(5 marks)*

(speed – deposition – rivers – canyon)

1. Both of valleys and canyons often have .... or streams flow through their lowest points.
2. Deltas are formed when the .... of the river water decreases, which causes deposition of sediments.
3. The plants of wetland and their roots cause increase of the rate of .... process.
4. When the sides of a valley become steep, this valley may be changed into a ....

(B) Complete the sentence below each picture using the following words :

(Weathering – Erosion – Deposition)



Small rocks of a mountain

1. .... process.



Formation of new lands at river's end

2. .... process.



Carving of a mountain by a river stream

3. .... process.

Assess your Learning

Questions of the School Book on Theme (4)

- **Choose the correct answer :**

1. When a rock's surface is eroded due to weather factors, this indicates the occurrence of .... process.
   a. weathering b. deposition c. transfer d. erosion
2. Dissolving metals forming rocks is an example for ....
   a. mechanical weathering. b. erosion by wind.
   c. deposition in rivers. d. chemical weathering.
3. Which of the following indicates the occurrence of chemical weathering process ? ....
   a. Water freezes inside rocks.
   b. Mixing the acidic water with rocks.
   c. Trees' roots grow in rocks cracks.
   d. Rocks colliding with each other as a result of water current.
4. What is the process in which the landforms change due to weathering factors ? ....
   a. Expansion. b. Weathering. c. Erosion. d. Evaporation.
5. When rocks break down into small pieces, this indicates the occurrence of .... process.
   a. mechanical weathering b. chemical weathering
   c. erosion by wind d. erosion by water
6. Which of the following is an evidence of erosion ? ....
   a. Sand dunes formation. b. Forming rocks crumbs.
   c. Nile River delta formation. d. Forming of sedimentary rock.
7. Forming red rust in sedimentary rocks is an evidence of occurring of .... process.
   a. erosion of sedimentary rocks b. mechanical weathering
   c. chemical weathering d. transfer and deposit of crumbs
8. Steep valleys formed due to flowing water erosion are called ....
   a. canyons. b. sand dunes. c. hills. d. deltas.
9. The formation of sand dunes in Eastern Desert in Egypt is due to the movement of ....
   a. floods. b. winds. c. waves. d. torrents.

10. At the convergence of flowing river water that carries clay and sediments with the sea, landform which is called .... is formed.

a. delta b. sand dune c. dam d. canyon

11. Which of the following landforms is steep and formed due to power of flowing water erosion ? ....

a. Plains. b. Valleys.
c. Canyons. d. Mountains.

12. The presence of sand dunes or the deposits in a region, tells us that they are ....

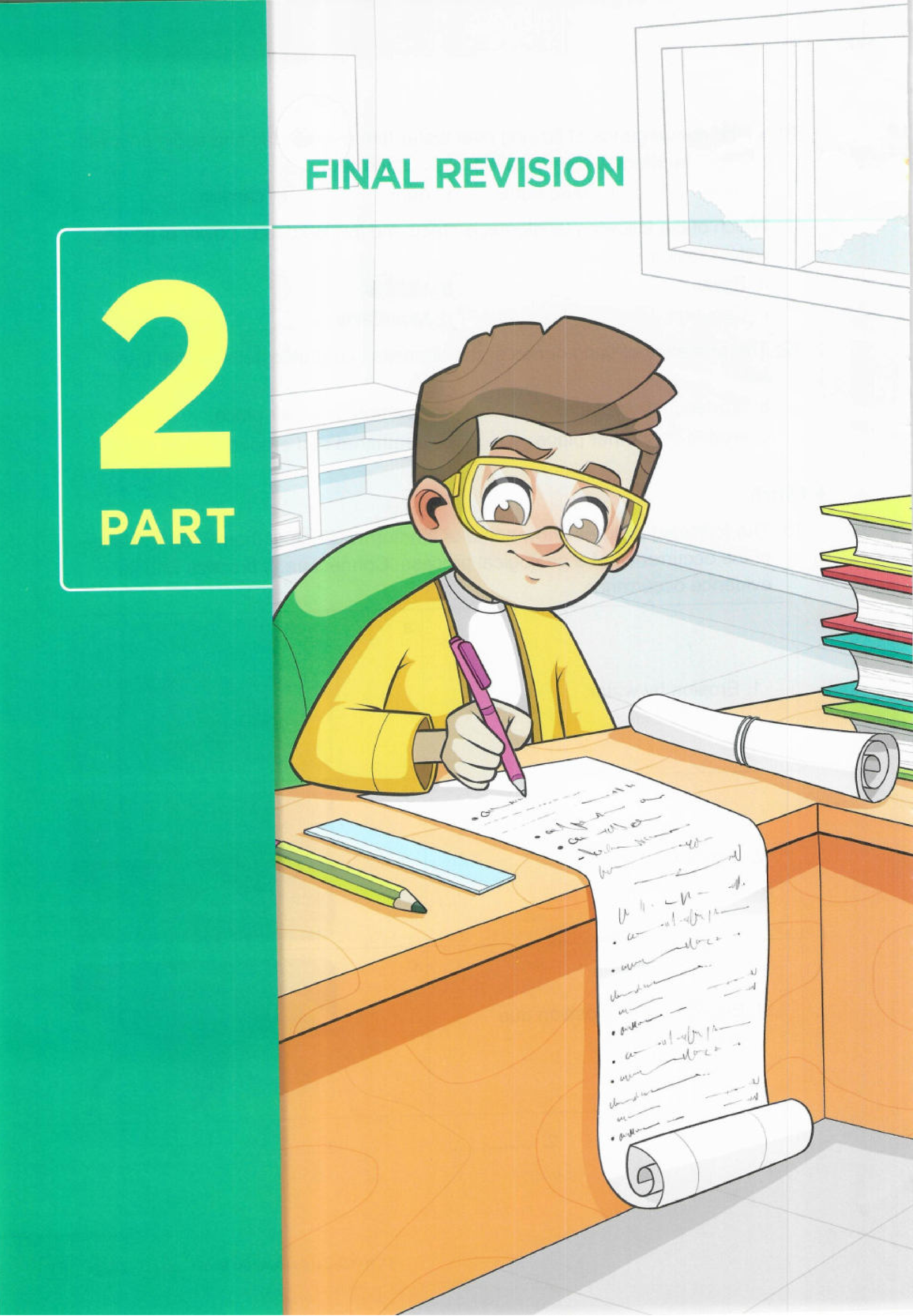
a. eroded in their place. b. weathered in their place.
c. eroded in another place. d. weathered and eroded in their place.

- **Match :**

13. The following pictures show some of landforms. Each of them is an evidence of the occurrence of a geological process. Connect each process with its evidence occurrence.

1. Erosion by water.	a.	
2. Deposits of river.	b.	
3. Erosion and deposition due to wind.	c.	

1. .... 2. .... 3. ....


FINAL REVISION
2
PART

Contents of Part Two | Final Rivision

THEME 3 Protecting Our Planet

UNIT THREE : Energy and Fuels

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Review on Concept (3.1)

1 Scientific terms (Definitions) :

Scientific terms	Definitions
1. Energy chain :	It is a way to describe the energy flow that occurs when we use different devices.
2. The law of conservation of energy :	Energy can neither be created nor destroyed, but only converted from one form of energy into another.
3. Wasted energy :	It is the output energy does not help the device do the function for which it was designed.

2 Importance or uses :

Items	Importance or uses
1. Mars rover Curiosity :	A robotic vehicle designed to explore the surface of Mars.
2. Battery inside the toys :	It converts chemical energy into electrical energy.

3 Give reasons for :

1. **A remote-controlled toy car needs a battery to move from one place to another.**
   Because the chemical energy stored in battery is converted into electrical energy that changes into kinetic energy that makes the car moves.

2. **Some calculators use the sunlight to operate.**
   Because the energy of sunlight (solar energy) is converted into electrical energy which calculators use it to be operated.

3. **Mars rover Curiosity operates for a long period of time on Mars without any need to be recharged.**
   Due to the presence of solar panels that use sunlight to recharge its batteries.

4. **There is an energy change when you press the spring of a soap dispenser.**
   Because the potential energy stored in its spring is converted into kinetic energy that moves the soap upward.

5. **When you rub your hands together, you feel warm.**
   Because the kinetic energy is converted into thermal energy.

6. **Not all the energy that enters the energy chain completely reaches the device.**
   Because some of the energy is wasted in the form of heat.

7. **You feel heat, when you put your hands near a lighted electric lamp.**
   Because some of the electrical energy is converted into thermal energy.

8. **The presence of batteries inside a toy car.**
   Because battery is the source of energy where the chemical energy is converted into electrical energy to operate the toy car.

9. **Thermal energy in a mobile phone is considered as a wasted energy.**
   Because it doesn't help the mobile phone to do its main function.

10. **The electrical energy that enters the hair dryer does not come out of the hair dryer in the same form of energy.**
    Because it is converted into kinetic, thermal and sound energies.

11. **Sound energy and thermal energy are considered as wasted energy in the blender.**
    Because they don't help the blender to do its main function.

4 What happens ...?

1. **If batteries of remote-controlled toy car run out.**
   The car will not move, so we can recharge its batteries by connecting toy car to a nearby charger or replacing old batteries with new ones.

2. **If solar calculators were exposed to the sunlight.**
   Solar energy is converted into electrical energy that operate them.

3. **If Mars rover Curiosity didn't get any sunlight on Mars surface.**
   It cannot be operated, because it depends on sunlight (solar energy) to recharge its batteries.

4. **To the change of energy when you turn on the television.**
   The electrical energy is converted into sound energy and light energy.

5. **To the change of energy when you burn a piece of wood.**
   The chemical energy is converted into thermal energy and light energy.

6. **To the change of energy when you shake a small bell with your hand.**
   The kinetic energy is converted into sound energy.

7. If you put your hands near the lighted lamp.

You feel warm, because some electrical energy is converted into thermal energy.

8. If you use a mobile phone for a long time.(according to the wasted energy).

Some energy is wasted as thermal energy.

9. If you turn on an electric fan. (according to the change of energy).

The electrical energy is converted into kinetic energy which do the main function of fan and sound energy as wasted energy.

5 Main points :

- Most of the energy we use is produced inside the Sun.
- Batteries inside the remote-controlled toys are the resource of chemical energy, as this energy is converted into electrical energy, which is converted into kinetic energy or sound energy.
- When the batteries run out of charge, they can be recharged by connecting the device to a nearby charger or by replacing the old batteries with new ones.

• **Mars rover Curiosity uses solar panels and batteries (which are charged by solar energy) as a source of energy, where:**

- The solar panels on the rover convert solar energy into electrical energy, which is used to charge the rover's batteries.
- The electrical energy from the batteries powers the vehicle's sensors and the electrical energy is also converted into kinetic energy and thermal energy as the vehicle moves across Mars surface.

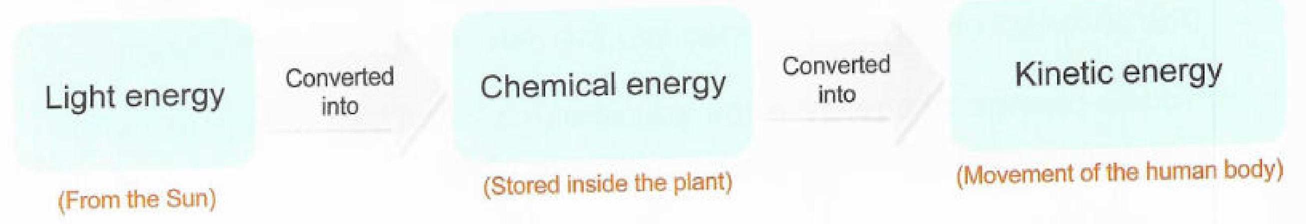
- Energy chains often start with the Sun.
- Some of the energy is wasted in different forms, while travelling through the energy chain, where most of the lost energy leaks out in the form of heat.
- All devices have energy coming in and out of them, where :

  The energy that comes in a device is called "input energy".

  The energy that comes out a device is called "output energy".

• **Energy chains :**

1. Energy chain when eating food :

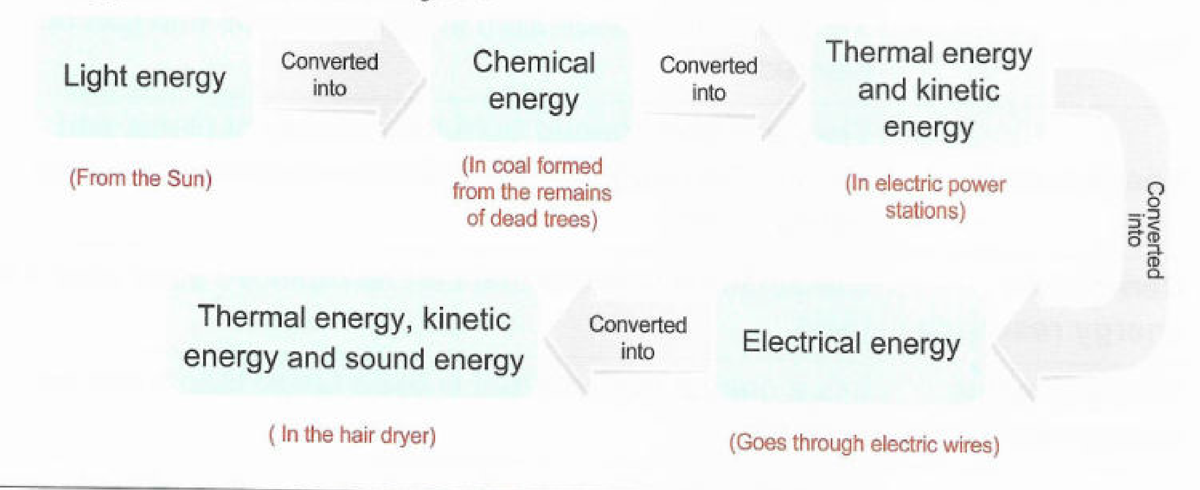


2. Energy chain when heating a pot of water over a fire :

Light energy → Converted into → Chemical energy → Converted into → Thermal energy

(From the Sun) (Stored inside the trees) (When burning the wood of trees to heat the water inside the pot)

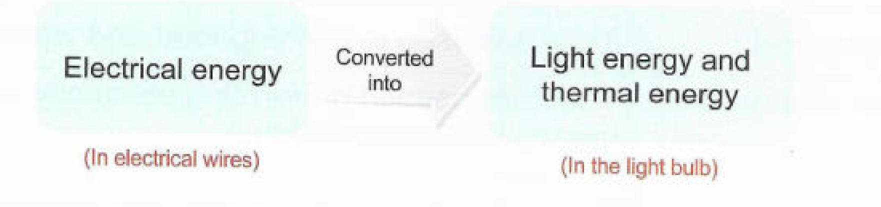
3. Energy chain in a hair dryer :



4. Energy chain while riding a bike :



5. Energy chain when a light bulb is switched on :



6. Energy chain in the mobile phone :

Electrical energy → Converted into → Chemical energy → Converted into → Electrical energy → Converted into → Sound energy and light energy

(When charging the mobile) (Stored in the mobile battery) (To operate the mobile phone) (Produce from the mobile phone)

Review on Concept (3.2)

1 Scientific terms (Definitions) :

Scientific terms	Definitions
1. Fuel :	It is any substance that produces thermal energy when it is burned.
2. Biofuels :	They are fuels made from living organisms that can be planted.
3. Fossil fuels :	They are fuels formed from the remains of plants and animals that were buried and decomposed over a long period of time.
4. Renewable energy resource :	It is a natural material that can be replaced soon after it is used.
5. Nonrenewable energy resource :	It is a natural material that is used faster than it can be replaced.
6. Acid rain :	It is a type of rain that is formed when carbon dioxide gas combines with water in the air.
7. Global warming :	It is a phenomenon in which the Earth's temperature increases, when carbon dioxide gas increases in the air.

2 Importance or uses :

Items	Importance or uses
1. Coal and wood :	They are used in cooking food and warming.
2. Gasoline and natural gas :	They are used in generating electricity and operating all means of transportation.
3. Generator :	It converts the kinetic energy into electrical energy.
4. Grass, corn and wood chips :	They are used to make a liquid fuel.

3 Give reasons for :

1. The fuel is very important for different means of transportation.
Because fuel is burned inside the engines to produce thermal energy that is changed into kinetic energy which causes the different means of transportation to move.

2. **Sometimes the fuel indicator of a car goes down.**
Because the fuel in the car tank runs out.

3. **Gasoline is burned inside a car engine.**
To produce thermal energy which changes into kinetic energy that causes the car to move.

4. **Water and wind are considered as renewable resources of energy.**
Because they can be replaced shortly after being used.

5. **Coal and gasoline are considered as nonrenewable resources of energy.**
Because they are used at a rate faster than they can be renewed.

6. **Using wood of trees as a fuel has negative effects on the environment.**
Because continuity of cutting down trees leads to deforestation.

7. **Generators are important in electric power stations.**
Because generators convert kinetic energy into electrical energy.

8. **We must turn off lights that we do not need.**
To conserve the electricity.

9. **Smog of cars is very dangerous to human health.**
Because the smog of cars causes irritation of human's eyes and lungs.

10. **Farmers must decrease the use of pesticides.**
Because pesticides cause the pollution of soil and water.

11. **Increase the burning of fossil fuel causes acid rain.**
Because burning fossil fuel produces carbon dioxide gas which combines with water in air forming acid rain.

12. **Global warming occurs due to the increase of burning coal and oil.**
Because burning coal and oil produces carbon dioxide gas which forms a layer in atmosphere that traps heat on Earth causing rise in Earth's temperature that causes global warming.

13. **Acid rain has a bad effect on buildings in cities.**
Because acid rain causes dissolving of some rocks including the rocks used for building.

14. **Fossil fuels cannot be replaced as quickly as they are used.**
Because fossil fuels are formed over millions of years.

15. **To keep the air clean, we must replace fossil fuels with renewable resources of energy.**
Because when fossil fuels are burned, they release gases that cause air pollution.

4 What happens ...?

1. **To the car fuel indicator if the amount of gasoline in a car decreases.**
   The car fuel indicator will go down.

2. **To the car movement if fuel runs out in a car.**
   The car movement decreases gradually until it stops.

3. **If people increase using the wood of trees as a source of fuel.**
   It leads to deforestation, which causes negative effects on the environment.

4. **If the remains of dead living organisms were buried under the Earth's surface over millions of years.**
   They are converted into fossil fuel.

5. **If decomposition of remains of sea animals under the Earth's surface.**
   They will form oil and natural gas.

6. **To a generator that is connected to a damaged turbine in an electric power station.**
   Turbine cannot produce kinetic energy, so the generator will not turn and don't generate electricity.

7. **To the movement of the turbine if the water in an electric power station is not heated.**
   Water will not produce steam, so the turbine will not move and will not produce kinetic energy.

8. **If pesticides mix with water of canals and rivers.**
   It causes the pollution of water and soil.

9. **If factories decrease their use of chemicals.**
   The pollution of air, water and soil will decrease.

10. **If acid rain falls on buildings for a long period of time.**
    It causes dissolving of the rocks used for building.

11. **If people decrease burning fossil fuels.**
    The amount of carbon dioxide gas in air will decrease.

12. **To the amount of fossil fuels if people don't conserve their usage.**
    Fossil fuel will run out on the Earth.

13. **To the Earth's temperature if we use renewable resources of energy instead of fossil fuels.**
    The Earth's temperature will not increase.

5 Comparisons :

1. Biofuel and fossil fuel :

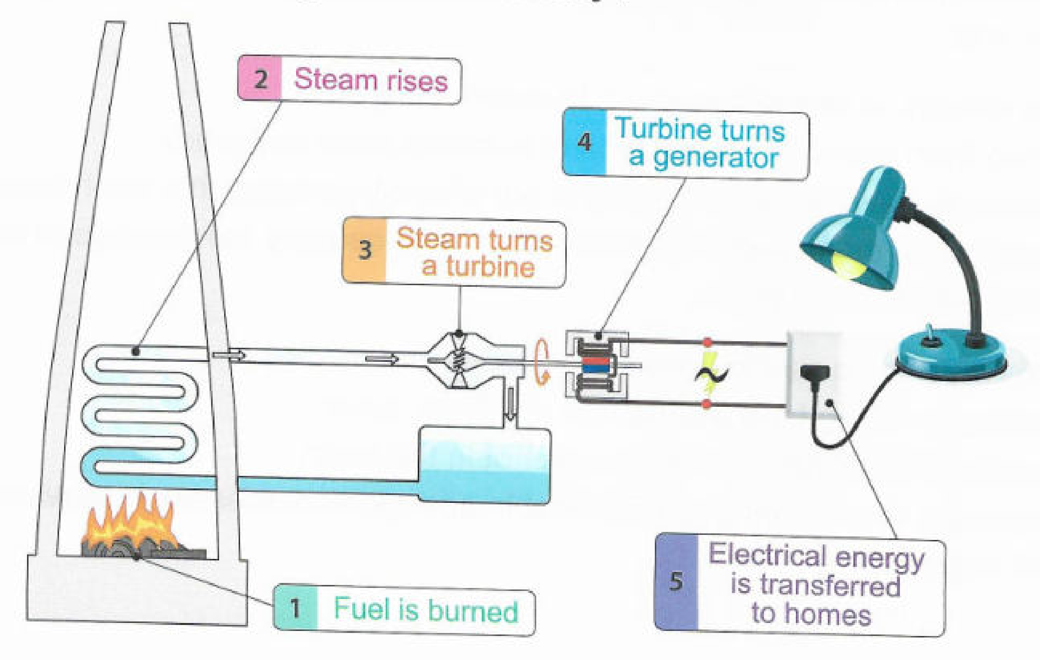
Points of comparison	Biofuel	Fossil fuel
1. Definition :	It is fuel made from living organisms that can be planted.	It is fuel made from the remains of plants and animals, that takes millions of years to be formed under certain conditions.
2. Renewable or nonrenewable :	Renewable.	Nonrenewable.
3. Examples:	Wood, grass and corn.	Natural gas, coal, oil and gasoline.

2. Renewable and nonrenewable resources :

Points of comparison	Renewable resource	Nonrenewable resource
1. Definition :	It is a natural material that can be replaced soon after it is used.	It is a natural material that is used faster than it can be replaced.
2. Examples:	Solar energy, water, wind energy and wood.	Coal, gasoline, oil and natural gas.

6 Important drawing :

- **Using fossil fuels to generate electricity :**



7 Main points :

- The original source of energy in biofuels and fossil fuels is the light energy of the Sun.
- **Formation of coal :**
  1. Millions of years ago, large areas of the Earth were covered in swamps, with a lot of plants growing nearby.
  2. When those plants died, their remains were decomposed and covered by hundreds of meters of mud and rocks.
  3. Due to the effect of the Earth's heat and pressure, those remains were turned into **coal**.

- **Formation of oil :**

  Oil comes from deep in the ground, where oil formed from the decomposition of sea creatures, as follows :
  1. When the marine creatures died, their remains settled on the ocean floor.
  2. Over millions of years, layers of sediments and rocks covered the remains of those sea creatures, these layers pressed down causing extreme heat and pressure.
  3. Over time, as a result of extreme heat and pressure, those remains converted into **oil**.

- **Some causes of pollution in big cities :**
  1. Smog produced from burning of fuels pollutes the air.
  2. Pesticides used in farms can be carried into water in canals and rivers when rain falls, this leads to pollution of soil and water.
  3. Chemicals used in many factories pollute the air and also the nearby water and soil.

- **Some effects of air pollution on human's health :**
  1. Smog from cars causes irritation of human's eyes and lungs.
  2. Scientists have found that smog is full of small particles that the human breathes in, these particles irritate the lungs, causing the damage of tissues of the respiratory system.

- **Some ways to conserve fossils fuels :**
  1. Walking or using bicycles instead of driving a car.
  2. Turning off the lights when you are not in the room.
  3. Replacing fossils fuels with renewable energy resources such as water, wind and solar energy.

• **Burning of coal and oil produces carbon dioxide gas which causes :**

1. Acid rain	2. Global warming
Carbon dioxide gas can combine with water in the air to form acid rain that leads to : - The death of trees. - The change in the chemical nature of lakes and kill fish. - The change in the chemical nature of soil. - Dissolving some rocks including the rocks used for building.	Increasing the amount of carbon dioxide gas in the air forms a layer in the atmosphere that traps heat on Earth causing a slow rise in the Earth's temperature, which is known as global warming.

Review on Concept (3.3)

1 Scientific terms (Definitions) :

Scientific terms	Definitions
1. Hydroelectric energy (hydroelectricity) :	It is a type of electrical energy generated by water turbines in dams.
2. Wind :	It is a natural movement of air that is resulted from the difference in temperatures between cold air and hot air.
3. Water cycle :	It is the process in which the water of rivers evaporates, then condenses forming clouds and return back to rivers through rainfalls.
4. Evaporation process :	It is a process in which water changes into water vapor.
5. Condensation process :	It is a process in which water vapor changes into water.

2 Importance or uses :

Items	Importance or uses
1. Solar panels :	They generate electricity by using solar energy which is used to operate light posts in streets.
2. Wind turbines :	They generate electricity by using the kinetic energy of wind.
3. Water turbines :	They generate electricity by using the kinetic energy of water.
4. Windmills :	They crushing grain to make flour.
5. Watermills :	They crushing grain to make flour.
6. Solar energy :	- In warming houses, by placing large windows on the walls that face the Sun for most of the day. - In greenhouses, radiant energy is converted into thermal energy which warms the inside of the greenhouses. - In cooking food, where convergent (concave) mirrors are used to collect and focus Sun rays to heat metal pots and cook the food inside. - In heating water, where solar water heaters are made of panels that are made of black pipes can be placed on the roof of houses to heat the water

7. Greenhouses :	They help farmers to plant the crops that only grow in warm climate.
8. Solar water heaters :	They heat the water by using solar energy through black pipes on the roof of houses.

3 Give reasons for :

1. **Humans used windmills and watermills from hundreds of years ago.**
Because they helped them to crush grain to make flour.

2. **Sometimes the Sun is not visible in the sky but you can feel its warmth.**
Because the atmosphere, land and water of Earth absorb the thermal energy of Sun which causes increasing in the Earth's temperature.

3. **Some electrical devices have solar panels which are composed of many solar cells.**
To absorb the solar energy coming from the Sun and convert it into electrical energy.

4. **Kinetic energy of wind affects the speed of wind turbine blades rotation.**
Because by increasing kinetic energy of the wind, the blades rotate faster and wind turbine generates more electricity.

5. **Sometimes the wind turbines are useless.**
Because sometimes the wind doesn't blow, so their blades don't move, so wind turbines don't generate electricity.

6. **Hydroelectric dams are built on rivers.**
To control the water flow and increase the potential energy of water to generate electricity.

7. **Water turbines are placed in waterfalls areas.**
Because water turbines convert kinetic energy of flowing water into electrical energy.

8. **Some dams contain water turbines.**
Because kinetic energy of moving water in dams is used to rotate water turbines to generate hydroelectric energy.

4 What happen if ...?

1. **Wind doesn't blow in an area that contains many modern wind turbines.**
The blades of wind turbines don't move and also don't generate electricity.

2. **Sunlight falls on solar panels.**
   The solar energy of the Sun is converted into electrical energy.

3. **Sunlight falls on a greenhouse.**
   The greenhouse absorbs the radiant energy from the Sun and convert it into thermal energy.

4. **The solar cells in a calculator are exposed to sunlight.**
   The solar cells absorb solar energy and convert it into electrical energy that is used to charge the battery of calculator.

5. **The kinetic energy of a wind that is applied on the wind turbine increases.**
   Its blades rotate faster and generate more electricity.

6. **There is difference in temperatures of air around Earth.**
   It causes the movement of air and wind blowing.

7. **Water turbines are placed in a dam.**
   Potential energy of water behind dams is converted into kinetic energy which causes water turbines rotate and generate electricity.

8. **Potential energy of water increases behind a dam that has water turbines.**
   It converts into more kinetic energy which causes water turbines rotate faster and generate more electricity.

9. **Water of seas and rivers evaporates, then condenses in the atmospheric air.**
   Clouds are formed and rain may fall.

5 Comparisons :

1. **Windmills and watermills :**

Points of comparison	Windmills	Watermills
Used energy :	Kinetic energy of wind.	Kinetic energy of water.
Advantages :	• Low cost. • Renewable energy resource.	• Low cost. • Renewable energy resource.
Disadvantages :	Sometimes the wind does not blow and the windmills do not move, so they are unable to do their job.	Sometimes the water source may dry up and the watermills do not move, so they are unable to do their job.

2. The use of water and the use of wind to generate electricity :

The use of water to generate electricity	The use of wind to generate electricity
Differences	
It is used in places where dams are built on rivers.	It is used in places with strong winds.
Similarities	
- Both of them are renewable energy resources. - Both of them use kinetic energy to operate turbines to generate electricity.	

6 Main points :

- The energy comes from the Sun is called "solar energy", which contains light and heat energies from the Sun.
- The solar energy that is produced by the Sun contains a type of energy called "radiant energy" (radiation) which is found in the Sun rays.

- **Solar panels** are composed of many small solar cells that capture solar energy (especially radiant energy) and convert it into electrical energy.
- **Uses of electricity generated by solar panels :**
  - Light the streets.
  - Recharge some types of batteries, like some calculators with small solar cells.
  - Operate various electric devices in houses.
  - Operate irrigation equipment in some villages.

- **The following diagram shows the energy chain of the wind turbines :**

Radiant energy (From the Sun) → Converted into → Thermal energy (Causing temperatures vary between hot air and cold air) → Converted into → Kinetic energy (In wind turbines) → Converted into → Electrical energy (In power lines)

- In wind turbines, when the kinetic energy of wind increases, the blades rotate faster, so the efficiency of wind turbine increases.

- **Water is used to generate electricity, as :**
  - Rivers flow downhill, the gravitational potential energy of water is converted into kinetic energy that helps rotate water turbines to generate electricity.
  - Hydroelectric dams are built on rivers to control the flow of water and increase the potential energy of water to generate electricity.

Review on Concept (4.1)

1 Scientific terms (Definitions) :

Scientific terms	Definitions
1. Canyons :	They are deep valleys covered by flowing water.
2. Weather :	It is the condition of atmosphere at a specific time and place.
3. Weathering :	It is the breaking down of rocks on Earth's surface into smaller (tiny) pieces.
4. Mechanical weathering :	It is the breaking down of rocks due to the effect of physical factors like wind, water, plant roots and temperature.
5. Chemical weathering :	It is the change of the structure of rocks due to chemical reactions.
6. Erosion :	It is the process in which the small particles (sediments) of sand, soil and rocks are moved to other places by wind, water and gravity.
7. Deposition :	It is the process of laying down of sediment after its erosion.

2 Give reasons for :

1. **Formation of canyons is considered as an example of slow changes.**
   Because they are formed due to the slow changes that happened to their rocks over many years.
2. **Iron in rocks may rust.**
   Due to the reaction between iron and oxygen of air.
3. **Water plays an important role in the formation of limestone caves.**
   Because water dissolves minerals in rocks, then these dissolved minerals combine again forming new shapes.
4. **Formation of a delta when a river meets a sea.**
   Because the sediments are deposited at the end of the river.
5. **Formation of sand dunes on a beach.**
   Because they are formed by the effect of weak winds.
6. **Formation of large sand dunes at Western Desert.**
   Because they are formed by the effect of strong winds.

3 What happens if ...?

1. **Sea waves hit costal rocks over a long period of time.**
   The shape of costal rocks will change due to breaking down of some parts of rocks.

2. Lichens growing on rocks produce acids.
The minerals of these rocks dissolve causing their breaking down.

3. A red-colored rust is formed on some rocks.
These rocks become weak and can be break down easily.

4. A river carries sediments meet a sea.
A delta may be formed.

4 Comparisons :

1. Fast changes and slow changes :

Fast changes	Slow changes
They are observed in a sandcastle which may completely disappear in few minutes as a result of its hitting by the sea waves.	They are observed in a coastal rocks over time, as there may be some little difference in its shape after many years if some parts break off.

2. Weather and weathering :

Weather	Weathering
It is the condition of atmosphere at a specific time and place.	It is the breaking down of rocks on Earth's surface into smaller (tiny) pieces.
• There are many factors affecting weather such as temperature, wind, rains, ... ect.	• There are many factors that cause weathering such as temperature, wind and water.
• The condition of weather can help us to decide what to wear when we go outside.	• Weathering can change the shape of Earth's surface over time.

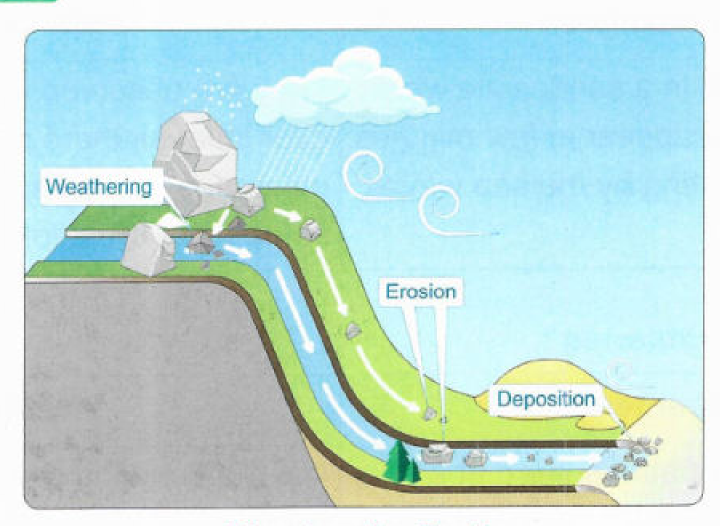
3. Mechanical weathering and chemical weathering :

Mechanical weathering	Chemical weathering
It is the breaking down of rocks due to the effect of physical factors like wind, water, plant roots and temperature.	It is the change of the structure of rocks due to the chemical reactions of rocks with some other materials such as oxygen, water, acid rain and acid produced by some living organisms.

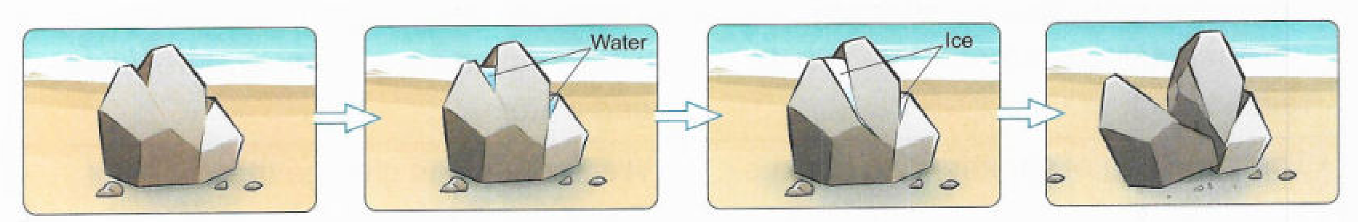
4. Weak winds and strong winds :

Weak winds	Strong winds
- They can form small sand dunes.	- They can form large sand dunes.
Example : • Sand dunes on a beach.	**Examples :** • Sand dunes in : - Western Desert in Egypt. - Rub' Al Khali in the Arabian Peninsula.

5 Important drawing :



Shaping the Earth



The role of temperature in mechanical weathering



Red colored rust in rocks



Limestone cave



Sand dunes in desert

6 Main points :

- Sand is formed by breaking down of some types of rocks.
- Forces of water and wind are responsible for the disappearance of sandcastles and erosion of coasts.
- **Canyons:**
  - Canyons are formed due to the slow changes that happened to its rocks over many years.
  - Canyons are formed by the action of water.
  - A canyon has needle-like parts and slopes at the sides.

- Earth's surface changes through different processes such as weathering, erosion and deposition.
- **You can see the effect of weathering in many observations around you such as :**
  - Breaking of statues.
  - Removing of paints of buildings.
  - Pulling a wave to the sand of seashores.
- There are two types of weathering which are mechanical weathering and chemical weathering.
- In the mechanical weathering we can see the breaking down of a substance without changing of its nature.
- In the chemical weathering we can see the breaking down of a substance and formation of another substance as a result of chemical reactions.

- Erosion may be happened by the action of wind, water or gravity.
- You can see the evidence left by erosion after hundreds, thousands or millions of years from its occurrence.

- Sediments are small solid materials such as sand, soil and small particles of rocks.
- Sediments are moved by wind and water and settles on the surface of land or the bottom of water bodies such as lakes and seas.

- Action of water in deposition :
  Running water in rivers play an important role in deposition process such as :
  - A river can deposit a sandbar along its banks (sides).
  - When a river carries sediments meet a sea, these sediments are deposited there forming a delta such as the Nile Delta.
- Sea waves also move sand from one place to another new place where it deposits there.

Review on Concept (4.2)

1 Scientific terms (Definitions) :

Scientific terms	Definitions
1. Canyon :	It is the landform that is formed by the effect of weathering and erosion due to wind, water or other factors.
2. Grand canyon :	It is a very large and steep canyon which is found in United States of America.
3. Valleys :	They are lowland areas in between mountains and have gently sloped sides around rivers.
4. Wind erosion :	It is the process by which the wind carves the rocks into different shapes.
5. Sand dunes :	They are landforms which are made of windblown sand when something like rock blocks the wind.

2 Give reasons for :

1. **Trees and other plants are growing on both sides of small canyons.**
   Due to flow of water stream which is needed by plants to grow.

2. **It might be useful to recognize signs of weathering, erosion and deposition.**
   Because it may help in building houses in safe places.

3. **The sides of canyon at the beginning of its formation are gently sloped.**
   Due to the help of water in eroding the sides down.

4. **Valleys have different shapes.**
   Because the shape of a valley depends on several factors including :
   - The types of rocks exist in the landscape.
   - The speed, age and size of river that form the valley.

5. **Canyon may be formed as a result of river streaming.**
   Because the fast flow of water can erode a lot of sediment and carry them away, that lead to a formation of canyons.

6. **Plants of wetland areas help in formation of deltas.**
   Because they help in increasing the rate of deposition process.

7. **A sand dune may be formed in front a large rock in desert.**
   Because the large rock can block the path of sand which is carried by wind.

3 What happens ...?

1. **To a flat land, if a water stream flows over it.**
   A small canyon may be formed.
2. **To a house that is built close to a river, if the path of the river is changed toward this house.**
   It causes weathering and erosion of the house.
3. **To a small canyon if it rained a lot and water ran through it for a longer time.**
   The small canyon could get deeper.
4. **If a river erodes the sediments of a mountain over a long period of time.**
   A canyon may be formed.
5. **If a river stream enters a sea.**
   A delta may be formed.
6. **If the speed of the river water decreases.**
   River drops the sediments which it is carrying forming deltas.
7. **If wind that is carrying sand particles hits a big rock.**
   Sand dunes may be formed.
8. **To the sand in a desert when wind blows by a great force.**
   The sand travels for a long distance.

4 Comparison :

Canyons and Valleys :

Canyons

- They are the areas that were eroded in mountains.
- Their walls are usually very high (have great depth), steep, narrow and consist of many layers of rocks.

Similarities

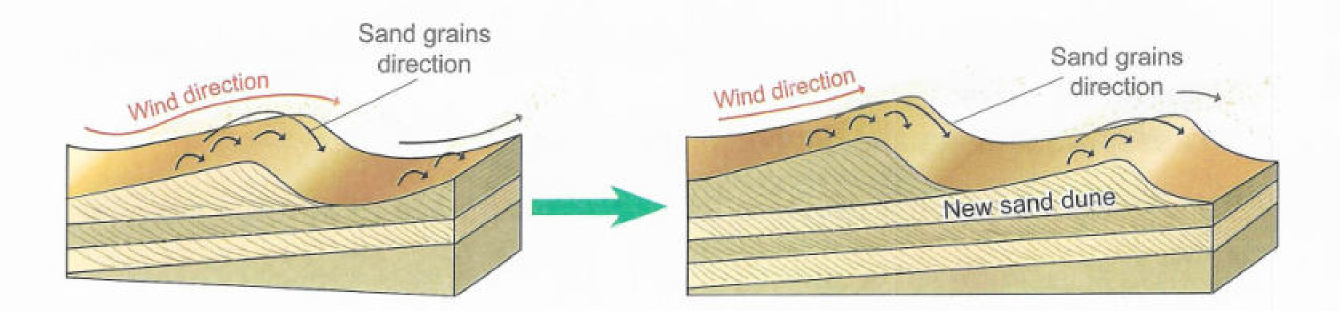
- Both of them can be formed by rivers or streams.
- Both of them often have rivers or streams flow through the lowest points.

Valleys

- They are lowland areas in between mountains.
- They have gently sloped sides that usually surround a wide, flat plain.

5 Important drawing :

Sand dunes movement :



6 Main points :

- A canyon can be formed in many ways, such as weathering and erosion due to wind, water and other factors.
- Canyons can take millions of years to form.

- **Canyons differ in their colors, texture and shape of rocks, where :**
  1. Wadi Nakhr canyon in Oman its color is brown and black but the small canyon in Thailand has a reddish color.
  2. Canyons can have V-shape as in colored canyons in Sinai and Wadi Rum canyon in Jordan.

- Canyons are special types of valleys that their sides are steep.
- **The shape of the valley depends upon several factors as :**
  - The types of rocks present in this landscape.
  - The speed, age and size of the river in this landscape.
  - Grand Canyon is an example of canyon that is found in the United States of America, and it is very large and steep, contains many layers of rocks.
  - Big streams or rivers cause more erosion than small streams.
  - Rivers that flow fast cause more erosion than rivers with slow flow.

- Deltas are formed by the process of deposition.
- **Most deltas are formed in two cases, where flowing water enters still water (immovable water) or slower moving water. And this two cases could be :**
  - A river stream enters a lake. - A large river stream enters sea of ocean.
- From the most famous deltas in the world is the Nile River Delta.
- **Large wetlands are formed in deltas.**

- **Plants that grow in the wetlands found in deltas increase deposition process because :**
  1. Plants are partly responsible for slowing down the river water.
  2. Roots of plants help in trapping sediments.
- Some landforms are created due to erosion and deposition processes by wind and sand at the same time as sand dunes.
- The sand dunes usually seen in groups, and they may cover a large area.
- The sand dunes can be hundreds of meters tall.
- Sand dunes are common landforms between beach and sandy desert.
- **The wind moves the sand where :**
  - The distance that the sand travels depends on the force of the wind.
  - The way the sand moves depends on the direction of the wind.
- The sand dunes often formed when something blocked the path of the sand, such as rocks.

3 PART

FINAL EXAMINATIONS:

- El-Moasser Final Examination Models.
- Final Examinations of some Governorates.



El-Moasser Final Examination Models

Model Exam 1

1 (A) Choose the correct answer :

1. The .... on the rover Curiosity convert solar energy into .... energy which is used to charge its batteries.
   a. solar panels – electrical b. batteries – electrical
   c. solar panels – sound d. batteries – sound
2. Sand is formed due to breaking down of ....
   a. glass. b. wood. c. rocks. d. plastic.
3. Among forms of fuel that present in car fuel stations are ....
   a. gasoline and wood. b. natural gas and coal.
   c. wood and coal. d. gasoline and natural gas.
4. All of the following are examples of renewable energy resources, except ....
   a. fossil fuel. b. waterfalls. c. wind. d. sunlight.

(B) What happens if ... ?

Lichens growing on rocks produce acids.

....

2 (A) Put (✓) or (✗) :

1. You need gasoline to move a bicycle. (   )
2. A solar panel consists of one small solar cell. (   )
3. Most of energy chains start with the moon. (   )
4. We cannot create a new form of energy, and also we cannot destroy an existed form of energy. (   )

(B) Correct the underlined word :

1. Deltas are formed by weathering process. (.........................)
2. Dunes are lowland areas which have gently sloped sides. (.........................)

3 (A) Write the scientific term of each of the following :

1. A device used to convert electrical energy into light energy. (.........................)
2. Natural resources of energy, that take a short period of time to be renewed. (.........................)
3. A natural movement of air that results from the difference in temperature between cold air and hot air. (.........................)
4. The energy produced from a battery. (.........................)

(B) Give a reason for the following :

We must turn off lights that are not needed for a while.

....

Model Exam 2

1 (A) Choose the correct answer :

1. The input energy when using the hair dryer is the .... energy.
   a. electrical　　b. potential　　c. kinetic　　d. thermal
2. The steps of forming fossil fuel, don't include .... of the remains of the living organisms.
   a. decomposing　　b. cooling　　c. burying　　d. heating
3. Fossil fuels need .... to be formed under the Earth's surface.
   a. five years　　b. ten years
   c. hundreds of years　　d. millions of years
4. Water flows through turbines in dams to generate .... energy.
   a. electrical　　b. potential　　c. solar　　d. light

(B) Give a reason for the following :

Iron inside rocks may rust.

....

2 (A) Complete the following sentences :

1. Both .... and .... are used to grind grains to make flour hundreds of years ago.
2. In any energy chain, some of the energy is lost in the form of ....
3. Wood and .... are examples of biofuel, while .... and .... are examples of fossil fuel.
4. When you ride a bicycle, the .... energy stored in your food is converted into .... energy which causes the bicycle to move.

(B) What happens if ...?

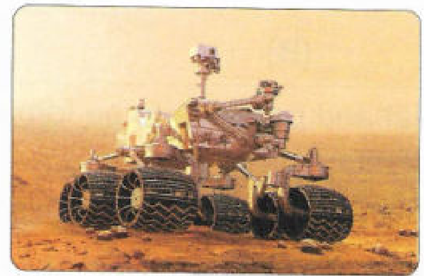
A river erodes the sediments of a mountain over a long period of time.

....

3 (A) Correct the underlined words :

1. When the water of a river travels downhill on a steep slope, its speed <u>decreases</u>. (..........................)
2. The valleys have <u>steep</u> slope. (..........................)
3. After death of living organisms, their remains are buried under the Earth's surface and exposed to extreme pressure and <u>cool</u>. (..........................)
4. Erosion process is usually followed by <u>weathering process</u>. (..........................)

(B) Look at the following figures, then put (√) or (x) :


Car (1)


Car (2)

1. The movement of the two cars can be controlled from a distance by using a remote control. ( )
2. Car (2) uses sunlight to move. ( )

Model Exam 3

1 (A) Choose the correct answer :

1. All the following are processes that can change the Earth's surface, except ....
   a. digestion. b. erosion. c. weathering. d. deposition.
2. Electric wires are made of ....
   a. copper. b. carbon. c. wood. d. glass.
3. All the following are forms of fuel, except ....
   a. wood. b. natural gas. c. gasoline. d. glass.
4. The Sun provides us with .... and ....
   a. sound – heat. b. light – electricity.
   c. sound – light. d. heat – light.

(B) Give a reason for the following :

The used amount of fossil fuel cannot be replaced as quickly as it is consumed.

....

2 (A) Correct the underlined words :

1. Curiosity is a robotic vehicle that is designed to explore the surface of moon. (.........................)
2. Hydroelectric energy, is one of nonrenewable energy resources. (.........................)
3. Small solar panels are used to supply one light bulb with sound energy. (.........................)
4. Toy cars depend on fuel as a source of electrical energy. (.........................)

(B) What happens if ... ?

You turn on an electric fan. (according to the change of energy)

....

3 **(A) Choose from column (B) what suits it in column (A) :**

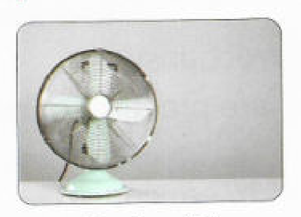
(A)	(B)
1. Water 2. Wind energy 3. Coal 4. The Sun	a. needs extreme heat and pressure to be formed from remains of dead plants. b. is the main resource of energy of the Earth's surface. c. is a gaseous renewable resource of energy. d. is a liquid renewable resource of energy. e. is a solid renewable resource of energy.

1. .... 2. .... 3. .... 4. ....

(B) Look at the following figures, then complete the following sentences :


Device (1)


Device (2)


Device (3)


Device (4)

1. The electrical energy used to operate devices number .... , ... and ....
2. Kinetic energy is produced in devices .... and .... to do their main function.

Model Exam 4

1 **(A) Choose the correct answer :**

1. All the following are renewable energy resources, except ....
   a. waterfalls. b. coal. c. the Sun. d. wind.
2. Hydroelectric energy is generated from ....
   a. waterfalls only. b. waterfalls and dams.
   c. biofuel only. d. biofuel and fossil fuel.
3. Both hair dryer and electrical water kettle produce .... energy.
   a. chemical b. thermal c. electrical d. potential
4. Some electric devices need .... energy to be recharged.
   a. electrical b. thermal c. potential d. sound

(B) Give a reason for the following :

Plants of wetland areas help in formation of deltas.

....

2 (A) Write the scientific term of each of the following :

1. A process in which water changes into water vapor. (........................)
2. The liquid that stores chemical energy, and it is used to move cars. (........................)
3. A fuel that is produced from remains of dead animals and plants under the Earth's surface. (........................)
4. It is a device that produces light from electricity. (........................)

(B) What happens if ...?

The charge of batteries of remote controlled toy car is running out.

....

....

3 (A) Put (✓) or (✗) :

1. Wind can pick up sand grains during the formation of sand dunes. ( )
2. Water can cause the two types of weathering. ( )
3. Deposition process never change the shape of the land. ( )
4. Sand travels for a short distance when wind blows with a great force. ( )

(B) Complete the following table :

	Used energy	Produced energy
1. Solar panels	.... energy	Light energy and .... energy
2. Wind turbines	.... energy	.... energy

Model Exam 5

1 (A) Choose the correct answer :

1. When you use the hand bell, the .... energy changes into sound energy.
   a. light b. thermal c. kinetic d. electrical
2. Using convergent .... sheets in cooking food is one of the benefits of using the solar energy.
   a. paper b. plastic c. mirror d. wooden
3. River water evaporates by the help of heat produced from ....
   a. kettles. b. the Sun.
   c. electric heaters. d. electric iron.
4. Extreme heat and pressure under the Earth's surface has an important role in forming ....
   a. wood. b. wind. c. fossil fuel. d. biofuel.

(B) What happens to ...?

The car fuel indicator if the amount of gasoline in a car decreases.

....

2 (A) Put (✓) or (✗) :

1. Sand dunes are formed by erosion only. ( )
2. There is a stored chemical energy inside the food we eat. ( )
3. Machines make our life more easier. ( )
4. We have to conserve all forms of fuel. ( )

(B) Give a reason for the following :

Water plays an important role in the formation of limestone caves.

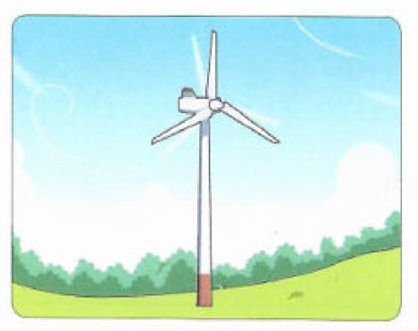
....

3 (A) Complete the following sentences :

1. When we expose our bodies to the Sun we feel ....
2. The energy can be .... from one form to another.
3. Sediments are mixed with the remains of plants and .... forming layers at the bottom of oceans and lakes.
4. Blowing of strong .... in the desert may form large sand dunes.

(B) If the two wind turbines in front of you are affected by the different wind forces. Answer the following questions :

Weak wind



Wind turbine (A)

Strong wind



Wind turbine (B)

1. Which wind turbine spins faster ? (Give a reason for your answer).

....

....

2. Which wind turbine generates less electrical energy ?

....

Model Exam 6

1 (A) Choose the correct answer :

1. When a river meets a sea or an ocean, a landform known as .... is formed.
   a. canyon b. volcano c. mountain d. delta
2. Oil is a nonrenewable energy resource that is used inside ....
   a. flash light. b. car engine. c. electric fan. d. washing machine.
3. It takes several .... for a spacecraft to travel from Earth to Mars.
   a. seconds b. minutes c. days d. months
4. You feel warm when you rub your hands together, because .... energy changes into thermal energy.
   a. kinetic b. light c. electrical d. sound

(B) What happens if ...?

Sea creatures were buried under the Earth's surface over millions of years.

....

2 (A) Correct the underlined words :

1. Water turbines generate electricity by using the energy of wind movement. (..........................)

2. Moon is the main source of energy on Earth. (..........................)

3. We need sound energy that comes from the Sun, for cooking foods and warming houses. (..........................)

4. Fossil fuels include oil, coal and wood. (..........................)

(B) Give a reason for the following :

Biofuel is considered as a renewable fuel.

....

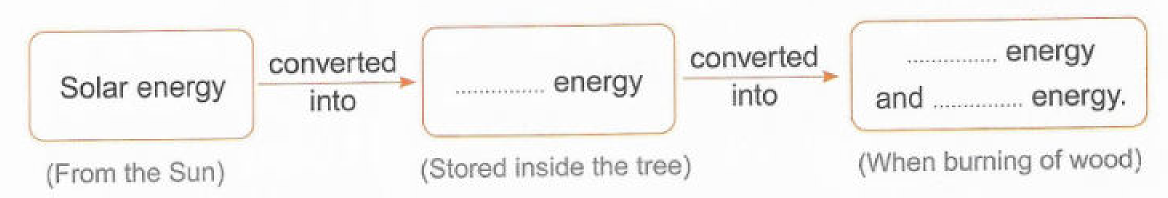
3 (A) Put (✓) or (✗) :

1. Both canyons and valleys often have river in their bottom. (   )
2. The walls of valleys are vertical and steep. (   )
3. Deltas are formed as a result of silt deposition. (   )
4. The Nile River Delta was formed by weathering and erosion processes only. (   )

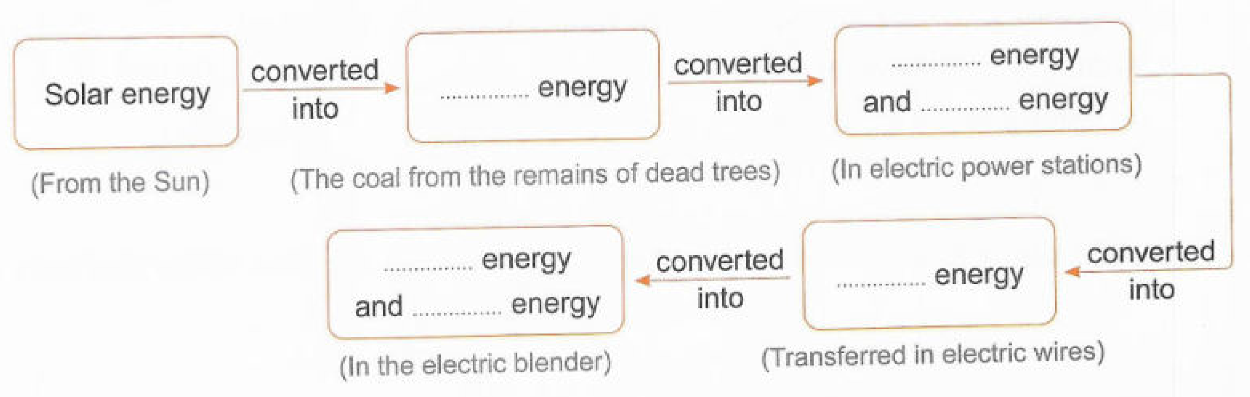
(B) Use the following words to complete the energy chains below. (you may use the same word more than once) :

(Thermal – Chemical – Kinetic – Electrical – Sound – Light)

1. The energy chain of burning some branches of a tree :



2. The energy chain of electric blender :



Model Exam 7

1 (A) Choose the correct answer :

1. All the following can be done by the effect of solar energy, except ....
   a. warming houses.
   b. cooking food.
   c. producing sound from a hand bell.
   d. producing light in a light post.
2. Sound and .... energies are from output energies when operating the mobile phone.
   a. electrical b. potential c. chemical d. light
3. We can use the energy obtained from burning of wood directly in all of the following situations, except ....
   a. warming houses. b. operating television.
   c. cooking food. d. boiling water.
4. When land and water areas on Earth absorb the solar energy, the .... on Earth increases.
   a. temperature b. water
   c. rocks d. ice

(B) What happens if ... ?

The kinetic energy of wind applied to the wind turbines decreases.

....

....

2 (A) Write the scientific term of each of the following :

1. A type of mirrors that is used to direct sunlight onto metal pots to heat them and cook the food inside. (.........................)
2. It is a form of biofuel, that can be made from some types of plants such as grass and wood chips. (.........................)
3. A turbine that converts the energy of flowing or falling water into electrical energy. (.........................)
4. The process in which laying down of sediment after its erosion. (.........................)

(B) Give a reason for the following :

Some calculators use solar panels to be operated.

....

....

3 **(A) From your understanding of how electricity is generated in electric power stations. Put each of the following words in front of its suitable sentence :**

(Coal – Steam – Turbine – Generator)

1. Its movement produces kinetic energy. (........................)
2. It changes kinetic energy into electrical energy. (........................)
3. It is a type of nonrenewable resources of energy. (........................)
4. It results from heating the water and it turns turbines. (........................)

(B) Look at the opposite picture, then complete the following sentences.



1. The name of this glass building is ....
2. The idea of working of this building depends on collecting the .... energy coming from the Sun.
3. The received energy is converted into .... energy that warms the inside of this building.
4. In the cold regions, this building allows farmers to plant crops that only grow in .... climates.

Model Exam 8

1 **(A) Choose the correct answer :**

1. Some kinetic energy is converted into .... energy due to friction of bike's tires with the road.
   a. light b. electrical c. potential d. thermal
2. Lichens produce .... on rocks that dissolve minerals found in these rocks.
   a. oxygen b. acids c. water d. rain
3. Inside the electric power station, heating of .... produces steam.
   a. turbines b. generators c. water d. fuel
4. While playing guitar, the .... energy changes into sound energy.
   a. kinetic b. light c. chemical d. potential

(B) Give a reason for the following :

When you press on the spring of soap dispenser, the soap moves upward.

(according to the change of energy)

....

2 (A) complete the following sentences :

1. There are two types of weathering which are .... weathering and .... weathering.
2. Dams control the flow of .... , that causes the increase of the .... energy of water.
3. In some villages, solar panels are used to generate .... energy that is used to operate .... equipment.
4. Types of weathering are .... weathering and .... weathering.

(B) What happens if ...?

You turn on the TV. (according to the change of energy)

....

---

3 (A) Give one example for each of the following :

1. A renewable resource of energy : ....
2. A nonrenewable resource of energy : ....
3. A method of conserving fossil fuel : ....
4. A disadvantage of using fossil fuel in energy production : ....

(B) Look at the following figures, then complete the following energy chain :

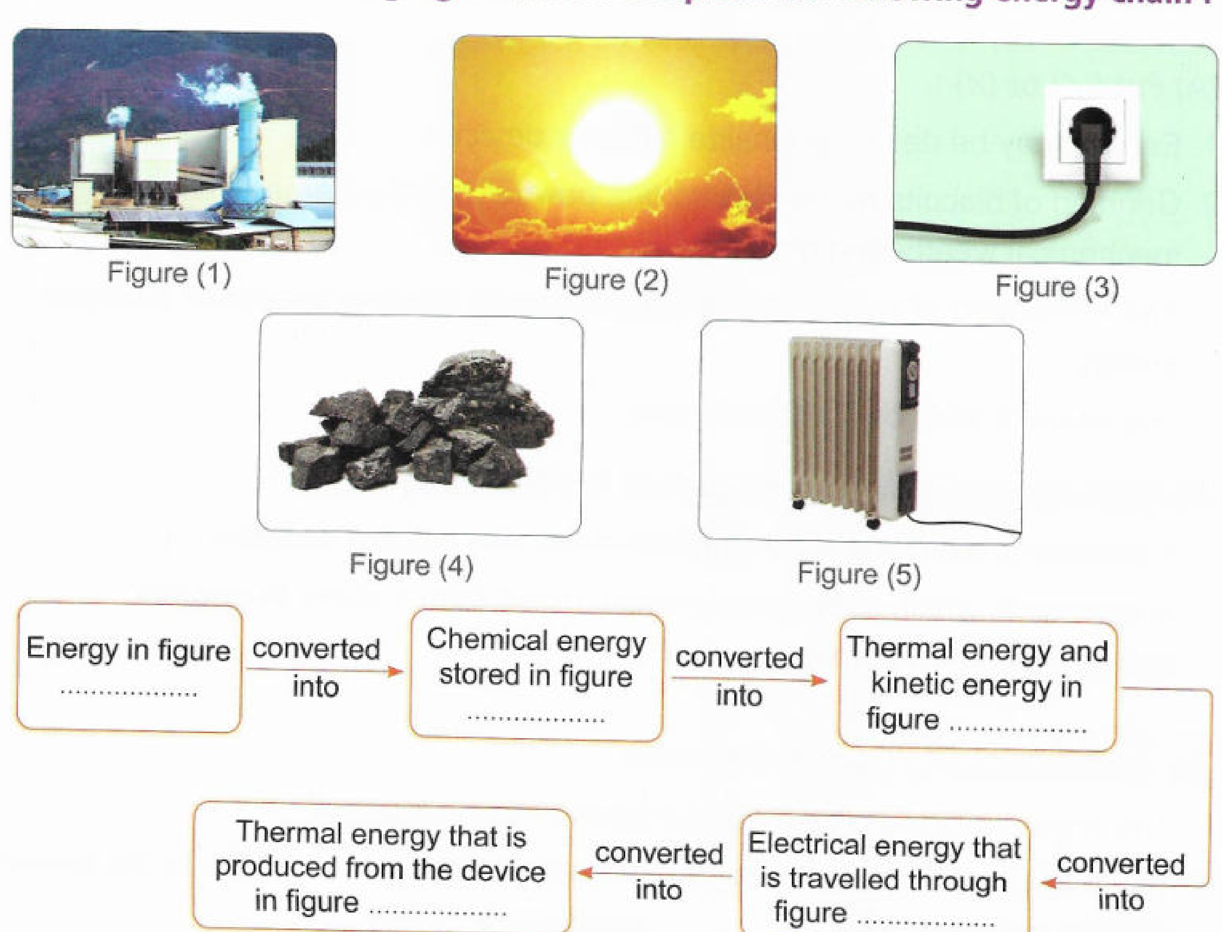


Figure (1) Figure (2) Figure (3) Figure (4) Figure (5)

Model Exam 9

1 (A) Choose the correct answer :

1. The output energy when playing drums is the .... energy.
   a. chemical b. light c. sound d. potential
2. If the rain falls over a canyon for several times per year, ...
   a. its depth increases. b. its depth decreases.
   c. it becomes flat. d. it is not affected.
3. When the blades of wind turbine rotate, this causes the turbine to rotate and generates .... energy.
   a. electrical b. solar c. chemical d. potential
4. All the following are forms of fossil fuel, except ....
   a. water. b. coal. c. natural gas. d. oil.

(B) What happens if ...?

A generator in an electric power station is damaged.

....

2 (A) Put (✓) or (✗) :

1. Energy may be destroyed inside different devices. (   )
2. Grinding of biscuits by hands into fine powder has the same effect of mechanical weathering of rocks. (   )
3. The movement of a generator in electric power stations produces potential energy. (   )
4. The amount of oil on Earth is limited. (   )

(B) Write the scientific term of each of the following :

1. A process in which rocks are broken down into smaller particles. (........................)
2. A process in which small broken rocks move from a place to another by the help of wind or water. (........................)

3 (A) Complete the following sentences :

1. The origin of sand is the breaking down of some types of ....
2. The type of weathering in which the rocks are broken down due to the presence of plant roots is known as .... weathering.

3. The change of electrical energy into sound energy in the radio is an example that proves the law of ....
4. The natural resources that can be replaced shortly after being used are called .... resources of energy.

(B) Mention the input and output energies of the opposite device :

1. Input energy : ....
2. Output energy : ....

Model Exam 10

1 (A) Choose the correct answer :

1. Which of the following is a renewable energy resource ? ....
   a. Running bicycle. b. Running car.
   c. Running water. d. Running person.
2. Curiosity rover is designed to explore ....
   a. Earth planet. b. Mars planet. c. the Sun. d. the moon.
3. The change of energy in an .... is opposite to the change of energy in a wind turbine.
   a. electric bell b. electric heater c. electric iron d. electric fan
4. All the following factors play an important role in the formation of fossil fuel, except ....
   a. extreme pressure. b. extreme heat.
   c. the moon light. d. rocks and sediment.

(B) Give a reason for the following :

Coal is considered as a nonrenewable energy resource.

....

2 (A) Write the scientific term of each of the following :

1. The matter that produces steam on heating, which is used to turn turbines in electric power station. (.........................)
2. A mill that is turned by water flow. (.........................)
3. A process in which the sediments are dropped in a new location by the action of wind, water, ice and gravity. (.........................)
4. The change of the structure of rocks due to chemical reactions. (.........................)

(B) What happens if ... ?

You put your hands near the lighted lamp.

....

---

3 (A) Correct the underlined words :

1. The amount of biofuel that is consumed, cannot be replaced as quickly as it is used. (..........................)
2. Dams are built on rivers in order to generate solar energy. (..........................)
3. The origin of sand is the breaking down of some types of glass. (..........................)
4. Plant roots help in the formation of rocks. (..........................)

(B) Look at these electric devices, then complete the following sentences :


Device (1)


Device (2)


Device (3)

1. Sound and light energies are produced in the device number .... and help it to do its function.
2. Noise from devices number .... and .... is wasted energy, because sound doesn't help the devices do their functions.



Final Examinations of some governorates

on the second term 2023

1 Cairo Governorate — Rod El Farag Educational Zone

1 (A) Choose the correct answer :

1. By rubbing hands .... energy is changed into thermal energy.
   a. chemical b. kinetic c. sound d. potential
2. .... is a type of biofuel which is made of wood.
   a. Coal b. Oil c. Charcoal d. Natural gas
3. .... causes mechanical weathering.
   a. Oxygen b. Acid rain c. Lichens d. Wind
4. When a rock blocks the path of flying sand, a .... may be formed.
   a. dune b. river c. valley d. canyon

(B) Give a reason for the following :

Wood is considered as a fuel.

....

2 (A) Put (✓) or (✗) :

1. Chemical energy is the energy that stored in food and battery. (   )
2. Electricity can be generated from water. (   )
3. The watermills convert electrical energy into kinetic energy. (   )
4. The Earth's surface never changes over time. (   )

(B) What will happen ...?

On shaking a hand bell. (according to the change of energy)

....

3 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Canyons	a. is the ability to do work.
2. Weathering	b. are natural resources of energy that take long period of time to be renewed.
3. Nonrenewable resources	c. is the breaking down of large rocks into small particles.
4. Energy	d. are deep valleys carved by flowing water.

1. .... 2. .... 3. .... 4. ....

(B) Give an example :

1. Renewable energy resource. (........................)
2. Fossil fuel. (........................)

2 Cairo Governorate — El Nozha Educational Zone

1 (A) Complete the following sentences :

(deposition – weathering process – water – thermal energy)

1. The unusable energy that produced from the electric lamp is ....
2. .... is a renewable source of energy.
3. When rocks break down into small pieces, this indicates the occurrence of ....
4. Nile River Delta in Egypt is formed due to .... process.

(B) Give a reason for the following :

Iron in rocks may rust.

....

2 (A) Put (✓) or (✗) :

1. There is a stored chemical energy inside the food we eat. ( )
2. In wind turbines, the kinetic energy is converted into chemical energy. ( )
3. Strong wind and hurricanes carry sand grains for a short distance. ( )
4. Sea waves may cause erosion of beaches. ( )

(B) What happens to ...?

The change of energy when you turn on the television.

....

3 (A) Choose from column (B) what suits it in column (A):

(A)	(B)
1. Water	a. it needs extreme heat and pressure to be formed from remains of dead plants.
2. Wind energy	b. it is the main source of energy on the Earth's surface.
3. Coal	c. it is a gaseous renewable resource of energy.
4. The Sun	d. it is a liquid renewable resource of energy.

1. .... 2. .... 3. .... 4. ....

(B) Complete the following energy chain in the hair dryer.

1. .... from the Sun → Chemical energy (coal) → Thermal & kinetic energies → 2. .... goes through wire → Thermal, sound & kinetic energies

3 Cairo Governorate — Heliopolis Educational Zone

1 (A) Choose the correct answer :

1. Which of the following is from causes of mechanical weathering ? ....
   a. Heat. b. Acid. c. Lichens. d. Oxygen.
2. The presence of the deposits in a region, tell us that they are ....
   a. eroded in their place.
   b. eroded in another place.
   c. weathered in their place.
   d. weathered and eroded in their place.
3. Energy is not destroy, nor create from nothing, this indicates ....
   a. destroying the energy resources.
   b. the consumer of energy resources.
   c. resources of energy are numerous.
   d. conservation and transformation of energy.
4. We can decrease the consumption of fossil fuel by using all the following except ....
   a. energy produced from Sun.
   b. energy produced from wind turbines.
   c. energy produced from burning gasoline.
   d. energy produced from water turbines.

(B) As you have learned, canyons and valleys can be formed in many ways such as weathering and erosion, both of them have characteristics.

Mention two factors which determine the shape of a formed valley ?

1. .... 2. ....

2 (A) Put (✓) or (✗) in front of the statement :

1. Green plants are one of the nonrenewable resources of energy. ( )
2. Sand dunes are created by erosion and weathering processes at the same time. ( )
3. Canyons are special types of valleys that have steep sides. ( )
4. Wind, oil and natural gas are natural resources used to generate clean energy. ( )

(B) Complete the following energy chain :

Potential energy → Converted into → 1. .... energy → Converted into → 2. .... energy

Waterfalls	Turbines	In wire

3 (A) Choose the correct answer :

1. Which of the following energy form is not produced from the Sun ? ....
   (Kinetic energy – Radiation energy)
2. Formation of red rust in some rock is an evidence of occurring .... process.
   (mechanical weathering – chemical weathering)
3. The produced energy from radio that reflects its main function is ....
   (electric energy – sound energy)
4. Which of the following landforms is steeped and formed due to the power of flowing water erosion ....
   (canyons – mountains)

(B) Water is one of the factors that causes weathering explain the results as shown in table :

	Mechanical weathering	Chemical weathering
Effect of water factor :	....	....

4 Cairo Governorate — El Waily Educational Zone

1 (A) Complete the following sentences using the words below :

(wind – changed – hot – coal)

1. Fossil fuel includes oil, ... and natural gas.
2. When we expose our bodies to the Sun we feel ....
3. The energy can be .... from one form to another.
4. Blowing of strong .... in the desert may form large sand dunes.

(B) Correct the underlined word :

Moon is the main source of energy on the Earth. (........................)

---

2 (A) Choose the correct answer :

1. Sand is formed due to breaking down of ....
   a. glass. b. wood. c. rocks. d. plastic.
2. All the following are examples of the renewable energy resources except ....
   a. fossil fuel. b. wind. c. sunlight. d. waterfalls.
3. Input energy when using the hair dryer is .... energy.
   a. electrical b. potential c. light d. kinetic
4. All the following are processes that can change the shape of Earth's surface, except ....
   a. weathering. b. digestion. c. erosion. d. deposition.

(B) Cross out the odd word :

Wood – Coal – Oil – Natural gas. (........................)

---

3 (A) Put (✓) or (✗) :

1. Energy may be destroyed inside different devices. ( )
2. Both valleys and canyons often have river in their bottom. ( )
3. The Nile River Delta was formed by weathering and erosion processes only. ( )
4. We have to conserve all forms of fuel. ( )

(B) What happens ...?

On turning an electric lamp. (according to changing in energy)

....

....

5 Giza Governorate — Dokki Educational Zone

1 (A) Choose the correct answer :

1. In the washing machine the .... energy is converted into kinetic and sound energy.
   a. thermal b. electrical c. light d. potential
2. Extreme heat and pressure under the Earth's surface has an important role in forming ....
   a. wood. b. fossil fuel. c. wind. d. biofuel.
3. Sand is formed due to breaking down of ....
   a. plastic. b. glass. c. rocks. d. wood.
4. Water turbines can generate more electricity by increasing the .... energy of water that is stored behind dams.
   a. light b. sound c. thermal d. potential

(B) What happens to ...?

The car movement if fuel runs out in a car.

....

2 (A) Put (✓) or (✗) :

1. Gravity doesn't affect the small rocks that have been broken down from mountains. ( )
2. When a piece of coal is burned, thermal energy is produced. ( )
3. Wind can pick up sand grains in forming sand dunes. ( )
4. A toy car can continue moving even after its battery runs out. ( )

(B) Write the scientific term :

The energy produced from playing guitar. (..........................)

3 (A) Complete the following statements by using the following words :

(weathering – kinetic – river – temperature – potential)

1. Global warming causes the raise of .... on Earth and changes its climate.
2. When the .... energy of wind increases, the speed of rotation of turbine blades will increase.
3. The process in which rocks are broken down into smaller particles is called .... process.
4. Valleys and canyons often have .... flow through their lowest points.

(B) Cross out the odd word :

Solar water heater – Hand mixer – Solar panel – Greenhouse. (..........................)

6 Giza Governorate — Agoza Educational Zone

1 (A) Choose the correct answer :

1. The output energy when using the hair dryers is the .... energy.
   a. electrical b. potential c. light d. thermal
2. Water flows through turbines in dams to generate .... energy.
   a. electrical b. potential c. solar d. light
3. All of the following are examples of renewable energy resources, except ....
   a. fossil fuel. b. waterfalls. c. wind. d. sunlight.
4. Sand is formed due to breaking down of ....
   a. glass. b. wood. c. rocks. d. plastic.

(B) What happens if ... ?

You turn on the TV. (according to the change of energy)

....

2 (A) Put (✓) or (✗) :

1. Most of energy chains start with the moon. ( )
2. There is a stored chemical energy inside the food we eat. ( )
3. The movement of a generator in electric power stations produces potential energy. ( )
4. Both sandcastles and canyons can be formed in few hours. ( )

(B) Cross out the odd word :

Gasoline – Coal – Natural gas – Wind. (........................)

3 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Water	a. generate electricity by using the kinetic energy of moving air.
2. Charcoal	b. it is a liquid renewable resource of energy.
3. Wind turbines	c. is a landform that is formed due to flooding of rain.
4. Canyon	d. it is a form of biofuels, that is made from wood.

1. .... 2. .... 3. .... 4. ....

(B) Correct the underlined word :

Curiosity is a robotic vehicle that is designed to explore the surface of the <u>moon</u>.

(........................)

7 Alexandria Governorate — Middle of Alex. Educational Zone

1 (A) Put (✓) in front of the correct sentences and (✗) in front of the wrong ones:

1. Floods are one of the factors that causes water erosion. ( )
2. Most energy chains start with the moon. ( )
3. Deposition process never change the shape of the land. ( )
4. Both canyons and valleys often have river in their bottom. ( )

(B) What happens when ...?

A river carries sediments meets a sea.

....

2 (A) Complete the following sentences :

(thermal – water – sound – electricity)

1. In hand bell, kinetic energy is converted into .... energy.
2. Fuel is used as a source of .... energy.
3. The shape of coastal rocks is affected by the force of .... and wind.
4. When the windmill blades rotates, this cause wind turbines rotate generating ....

(B) Cross out the odd word :

Solar water heater – Hand mixer – Solar panel – Greenhouse. (........................)

3 (A) Choose the correct answer :

1. Sand is formed due to breaking down of ....
   a. glass. b. wood. c. rocks. d. plastic.
2. When a rock blocks the path of flying sand, a .... may be formed.
   a. dune b. river c. valley d. canyon
3. The formation of canyons takes ....
   a. few days. b. few weeks. c. many weeks. d. many years.
4. Wood is considered as ....
   a. biofuel. b. fossil fuel. c. liquid fuel. d. gaseous fuel.

(B) Correct the underlined word :

Small sand dunes are formed due to <u>strong</u> wind. (........................)

8 Qalyoubia Governorate — Qalyoubia Educational Zone

1 (A) Choose the correct answer :

1. .... is the main source of energy on the Earth's surface.
   a. Oil b. Gasoline c. The Sun d. The moon
2. In water turbines ,the .... energy of water is changed into electrical energy.
   a. light b. kinetic c. thermal d. potential
3. From examples of renewable resources of energy is ....
   a. oil. b. wind. c. coal. d. natural gas.
4. .... may cause chemical weathering or mechanical weathering.
   a. Oxygen b. Water c. Rocks d. Lichens

(B) Cross out the odd word of the following :

Weathering – Photosynthesis – Deposition – Erosion. (........................)

2 (A) Put (✓) or (✗) :

1. Canyons can take millions of years to be formed. (   )
2. Most of energy chains start with the moon. (   )
3. Charcoal is formed from decomposition of remains of ancient plants. (   )
4. Biofuels are from nonrenewable resources of energy. (   )

(B) Write the scientific term of each of the following :

The kind of weathering that changes the structure and color of rocks.

(........................)

3 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Greenhouse	a. are used to generate electricity from solar energy.
2. Valley	b. usually has a triangle shape.
3. Delta	c. has gently sloped sides.
4. Solar panels	d. it helps to grow crops that only grow in warm climate.

1. .... 2. .... 3. .... 4. ....

(B) Give an example for :

Fossil fuel. (........................)

9 Menoufia Governorate — Menoufia Educational Zone

1 (A) Choose the correct answer :

1. The wasted energy that produced from the electric lamp is .... energy.
   a. potential b. chemical c. thermal d. light
2. Which of the following energy forms isn't produced from the Sun? ....
   a. Thermal energy. b. Light energy.
   c. Kinetic energy. d. Radiation energy.
3. Rusting of iron forming rocks is an example of ....
   a. mechanical weathering. b. weathering by wind.
   c. deposition in rivers. d. chemical weathering.
4. The output energy in the Mars exploration vehicle is .... energy.
   a. electrical b. light c. kinetic d. solar

(B) Complete the following figure :

1. .... —Used in→ Electric lamp —Produces→ 2. .... / 3. ....

2 (A) Write the scientific term of each of the following :

1. Any substance that produces thermal energy when it is burned. (......................)
2. The process by which sediments lay down after its erosion. (......................)
3. They are used in crushing grain. (......................)
4. A triangular landform formed from very fine bits of sand and clay that formed due to flow of river into the sea. (......................)

(B) What are the factors that cause mechanical weathering ? (2 points only)

1. .... 2. ....

3 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. Water 2. Law of conservation of energy 3. Canyon 4. Solar panels	a. generate electricity by using solar energy. b. energy doesn't destroy, nor create from nothing. c. is steep landform and formed due to power of flowing water erosion. d. is renewable resource of energy.

1. .... 2. .... 3. .... 4. ....

(B) Give a reason for the following :

We must conserve the fossil fuels.

....

10 Dakahlia Governorate — Science Inspectorate

1 (A) Complete the following :

1. Light energy is converted into .... energy which is stored in the form of sugar inside the trees.
2. .... is the main source of energy on the Earth's surface.
3. .... are deep valleys carved by flowing water.
4. .... is the process of lying down of sediments after its erosion.

(B) What happens when ...?

Acid rain falls on rocks.

....

2 (A) Put (✓) or (✗) :

1. Using solar energy is a way to conserve fossil fuels. ( )
2. Water is a nonrenewable resource that is used to generate hydroelectricity. ( )
3. Wind turbines convert the kinetic energy into electrical energy. ( )
4. Canyons are formed in a short period of time. ( )

(B) What is the role of wind in mechanical weathering ?

....

....

3 (A) 1. Write the scientific term of each of the following :

1. Energy is neither created nor destroyed, but it changes from one form to another. (........................)
2. A gas in air combines with iron of some rocks and causes their weakness. (........................)

2. Complete the following table :

Device	Input energy	Output energy
1. **Electric heater :**	....	....
2. **Hand bell :**	....	....

(B) Give a reason for the following :

Hydroelectric dams are built on rivers.

....

....

11 Ismailia Governorate — Science Inspectorate

1 (A) Complete the following statements using words between brackets:

(wind – gravity – thermal energy – nonrenewable – electricity)

1. Coal and oil are considered as .... resources of energy.
2. The force that pulls down broken rocks at mountain side is called ....
3. Wind turbines are used to generate ....
4. When strong .... blow in desert, large sand dunes are formed.

(B) Give a reason for the following :

Iron in rocks may rust.

....

2 (A) Choose the correct answer :

1. The dropping of sediments in a new place is known as ....
   a. erosion. b. freezing. c. weathering. d. deposition.
2. Extreme heat and pressure under the Earth's surface has an important role in forming ....
   a. wood. b. wind. c. fossil fuel. d. biofuel.
3. From factors of mechanical weathering ....
   a. oxygen. b. acid rains.
   c. temperature. d. acids of lichens.
4. The output energy that is not from the job of hair dryer is ....
   a. chemical. b. sound. c. kinetic. d. light.

(B) Correct the underlined word :

Dunes are lowland areas which have gentle sloped sides. (........................)

3 (A) Choose from column (B) what suits it in column (A) :

(A)	(B)
1. A robotic vehicle designed to explore the surface of Mars is	a. erosion.
2. Solar panels are used to generate	b. fuel.
3. The substance that produces thermal energy when it is burned is	c. Mars rover Curiosity.
4. The process of movement of sediments from one place to another is	d. deposition.
	e. electrical energy.

1. .... 2. .... 3. .... 4. ....

(B) What happen if ...?

River erodes the rock of mountain over a long period of time.

....

12 Suez Governorate — South Educational Zone

1 (A) Choose the correct answer :

1. Lichens produce .... on rocks that dissolve minerals found in these rocks.
   a. oxygen b. acids c. water d. rain
2. All of the following are forms of fuel, except ....
   a. natural gas. b. gasoline. c. coal. d. glass.
3. The formation of canyons takes ....
   a. few minutes. b. few hours. c. few days. d. many years.
4. The energy source in a toy car is ....
   a. engine. b. wires. c. battery. d. wheels.

(B) Give a reason for the following :

Iron in rocks may rust.

....

....

2 (A) Put (✓) or (✗) :

1. When iron in rock rusts, the rock becomes more stronger. ( )
2. We have to conserve all forms of fuel. ( )
3. Both coal and wood produce thermal energy when they are burned. ( )
4. Wind is a nonrenewable energy resource. ( )

(B) There are many types of sediments. Mention 2 types of them.

....

3 (A) Complete the following sentences by using these words:

(decreases – rocks – thermal – kinetic)

1. The origin of sand is the breaking down of some types of ....
2. In the washing machine electrical energy converted into .... energy.
3. When the force of wind ...., the sand can't travel for a long distance.
4. We need .... energy for cooking food and warming houses.

(B) What happens if ... ?

The wind that is carrying sand particles hits a big rock.

....

....

13 El-Behira Governorate — Kafr El-Dawar Educational Zone

1 (A) Choose the correct answer :

1. Fossil fuel is extracted from ....
   a. the Earth's surface b. the underground. c. the food. d. the water.
2. The Sun and wind are considered as .... resources of energy.
   a. renewable b. nonrenewable c. destroyed d. harmful
3. Breaking down of rocks due to acids is known as ....
   a. erosion. b. sediments.
   c. mechanical weathering. d. chemical weathering.
4. Energy produced from the electric bulb is .... energy.
   a. chemical b. sound c. light d. kinetic

(B) Give a reason for the following :

Fossil fuel can't be replaced soon after it is used.

....

2 (A) Put (✓) or (✗) :

1. One of wind turbines advantages is that it can generate electricity in any time even though the wind doesn't blow. ( )
2. Coal was formed from the sea animals remains. ( )
3. Erosion is the process in which the small particles are moved to other places. ( )
4. Canyons are similar in their colors, texture and shapes. ( )

(B) What happen if ...?

Oxygen of air reacts with iron of some rocks.

....

3 (A) Complete the following sentences:

1. .... is a deep valley carved by flowing water.
2. The Sun provides Earth with light and ....
3. Energy produced from the radio which helps the device do its main function is .... energy.
4. .... is the breaking down of rocks into smaller pieces.

(B) Mention energy changing in the following table :

Device	Consumed (input) energy	Produced (output) energy
1. Hair dryer :	....	....
2. Fan :	....	....

14 Minia Governorate — Bani Mazar Educational Zone

1 (A) Choose the correct answer :

1. The output energy when playing drums is the .... energy.
   a. chemical b. light c. sound d. potential
2. Sand is formed due to breaking down of ....
   a. glass. b. wood. c. rocks. d. plastic.
3. The input energy when using the lamp is the .... energy.
   a. electrical b. potential c. kinetic d. thermal
4. All the following are forms of fossil fuel, except ....
   a. water. b. coal. c. natural gas. d. oil.

(B) What happens if ...?

You put your hands near a lighted lamp.

....

....

2 (A) Put (✓) or (✗) :

1. Energy may be destroyed inside different devices. ( )
2. Sand dunes are formed by erosion only. ( )
3. Most of energy chains start with the Sun. ( )

(B) Correct the underlined words :

1. Deltas are formed by weathering process. (........................)
2. Dams are built on rivers to generate solar energy. (........................)

3 (A) Write the scientific term of each of the following :

1. The energy used to play a drum. (........................)
2. Process in which rocks are broken down into smaller particles. (........................)
3. A mill that is turned by wind flow. (........................)
4. It is any substance which produces thermal energy on burning. (........................)

(B) Mention the input and output energies of the opposite device.

1. Input energy is ....
2. Output energy is ....

15 Qena Governorate — Science Inspectorate

1 (A) Choose the correct answer :

1. The output energy when playing drums is the .... energy.
   a. chemical b. light c. sound d. electrical
2. Water flows through turbines in dams to generate .... energy.
   a. electrical b. potential c. light d. solar
3. Sand is formed due to breaking down of ....
   a. glass. b. wood. c. rocks. d. plastic.
4. .... is a steep valley that is formed due to flowing of water steams.
   a. Canyon b. Mountain c. Hill d. Sand dune

(B) Give a reason for the following :

Iron inside rocks may rust.

....

....

2 (A) Put (✓) or (✗) in front of the following statements:

1. You need gasoline to move a bicycle. ( )
2. When fuel is burned, it produces thermal energy. ( )
3. Wind can be considered as one of the factors that cause weathering. ( )
4. When water freezes, its volume decreases. ( )

(B) What happen when ...?

You turn on an electric lamp. (according to the change of energy)

....

3 (A) Correct the underlined words :

1. Light energy is stored inside the battery of mobile phone. (........................)
2. Fossil fuel includes oil, coal and wood. (........................)
3. Small hills of sand found in a desert are known as canyons. (........................)
4. Erosion process is usually followed by weathering process. (........................)

(B) Mention a device that converts electrical energy into both kinetic and sound energy.

....



Projects :

- Unit Three Project.
- Interdisciplinary Project.
- Unit Four Project.

Safety First!

UNIT THREE Project

Dam Impacts

- In modern times, scientists and engineers use the kinetic energy found in rivers water to generate electrical energy by building dams on rivers to control the flow of rivers water and use it to rotate water turbines that generate electricity.

- Building dams on rivers to generate electricity depends on the idea of making artificial waterfalls to simulate natural waterfalls, in order to increase the kinetic energy of river water, which is used to rotate water turbines to generate a type of electrical energy known as "hydroelectric energy".



Water dam

- **Building dams has many advantages and benefits for humans and the environment, such as :**
  - Providing people with the electrical energy needed for lighting and operating different devices in homes, factories... etc.
  - Helping people control the level of the river water to protect the agricultural lands on both sides of the river from the danger of flooding.

- **However, building dams also has many disadvantages and negative effects on humans and the environment, such as :**
  - Changing the path of rivers, which affects the migration of fish through these rivers, which causes the death of fish or their migration to other water areas, so people are affected as they depend on fish as a source of food.
  - Lakes that are formed behind dams cover large areas of land with a very big amount of water and these lands are considered as a habitat to many animals and plants, so this leads to the death of these animals and plants or the migration of these animals to other areas.



Flood

Use the previous text or online sources to make a research project about dams.

Your research must include the following main points:

- An energy chain shows the energy changes of the kinetic energy of moving water to get electrical energy in a dam.
- Advantages of building dams for humans and environment.
- Disadvantages of building dams for humans and environment.
- Finding a solution to one of the problems of building dams.

Energy chain of a dam :

Advantages of building dams :

....

....

....

....

Disadvantages of building dams :

....

....

....

....

....

A solution to one of the problems of building dams :

....

....

....

....

INTERDISCIPLINARY Project

Sunny Side Up

- **In many villages around the world, people depend on wood of trees as fuel to cook food, and for this reason people in these areas cut down a lot of trees that leads to the removal of a lot of forests worldwide causing deforestation which has negative effects on the whole world, such as :**
  - The disappearance or death of some animals that lived in these forests before they were removed.
  - The disappearance of many types of plants that are used in the manufacture of medicines.

Deforestation

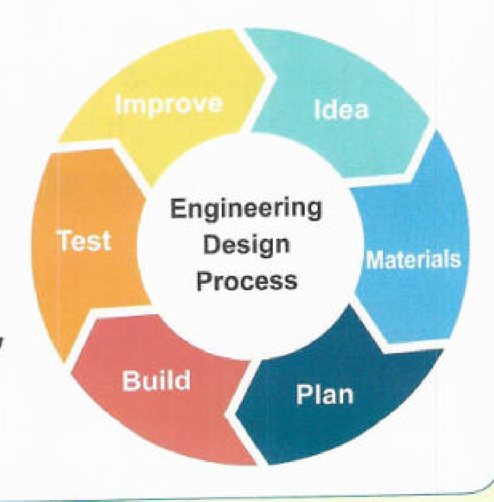
- Deforestation can be stopped by using solar energy instead of wood of trees as a source of energy for cooking food because solar energy is free, clean and renewable energy.
  But, there are some difficulties that humans face when using solar energy as a source of energy, including :
  - The materials used to collect solar energy are very expensive.
  - The amount of sunlight that reaches the Earth is not the same from one place to another on Earth's surface.



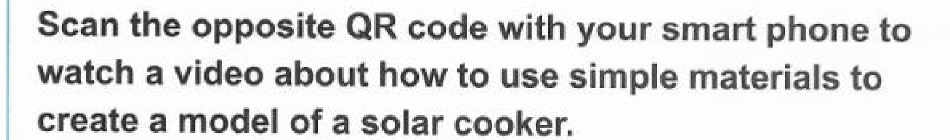
Solar cooker

- A solar cooker is a device that converts solar energy into thermal energy used in cooking food.
  It contains metal plates placed in a certain way to collect the largest amount of solar energy and focus it in one area, and it also contains materials that keep the generated thermal energy inside the solar cooker for a period of time enough to cook food inside.

▶ **In this project, use the steps of the "Engineering Design Process" that you have learned in the previous educational grades to create a model of a "Solar Cooker" that can be used in sunny regions to cook food.**



Note



Scan the opposite QR code with your smart phone to watch a video about how to use simple materials to create a model of a solar cooker.



Idea

Create a model of a solar cooker that can be used to cook food using some simple materials.

Materials

You may use the following materials to create your solar cooker :

Carton box

Glue

Black paper sheet

Aluminum foil

White cork sheets

Transparent plastic sheet

Wooden stick

Plan

....

....

....

....

....

....

....

....

Build

Draw the design of your solar cooker model.

Test

Test your solar cooker and write your observations and problems you may find in your model.

....

....

....

....

Improve

Write down your ideas to improve your solar cooker model.

....

....

....

....

....

UNIT FOUR **Project**

Forces That Shape the Earth

- **Wadi Nakhr's landscape has been shaped by the weathering forces of wind, water, ice and erosion. You can also find evidence of volcanic activity that occurred millions of years ago, where :**

Wadi Nakhr

  - Wind, water and ice are factors of mechanical weathering that break rocks into smaller pieces, then wind and water carry these pieces away through the erosion process. When these sediments deposite and exposed to pressure they form different layers of rocks.
  - Some volcanoes form sharp peaks of mountains, and also when the molten lava that comes out of these volcanoes cools, they form igneous rocks like basalt.

- **Look at the following images of landforms in Wadi Nakhr and predict what factors (like erosion, weathering, volcanoes, ... etc.) played an important role in shaping landscape over time and explain your reasoning :**

Image	Which factors affected the formation of this landform ?	Reasoning : Explain your thinking
Large chunks of basalt	....	....

Image	Which factors affected the formation of this landform ?	Reasoning : Explain your thinking
Smooth, steep sides		
Deep canyon, layers of rock		
Rippling mountainside		



SERIES

SCIENCE

By A Group of Supervisors



Guide Answers





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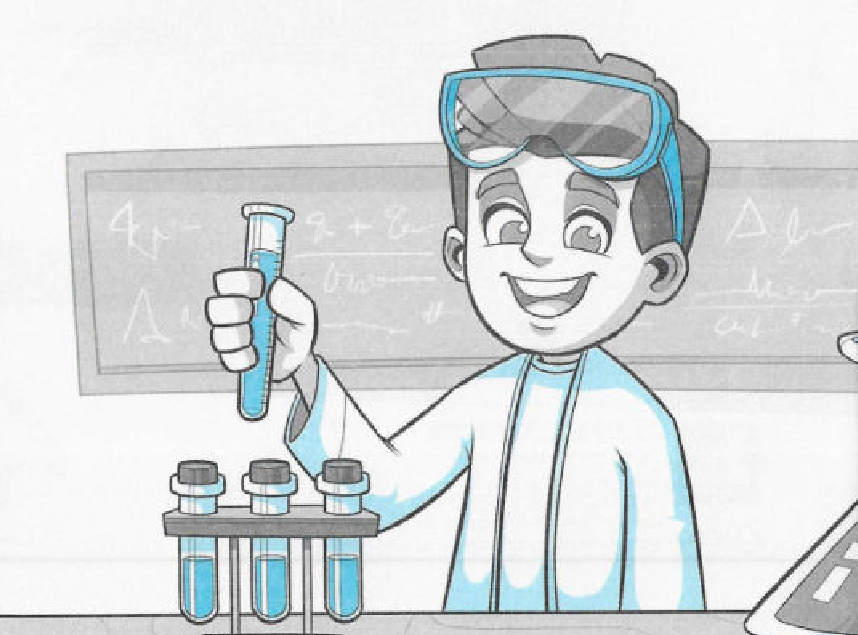
SECOND TERM

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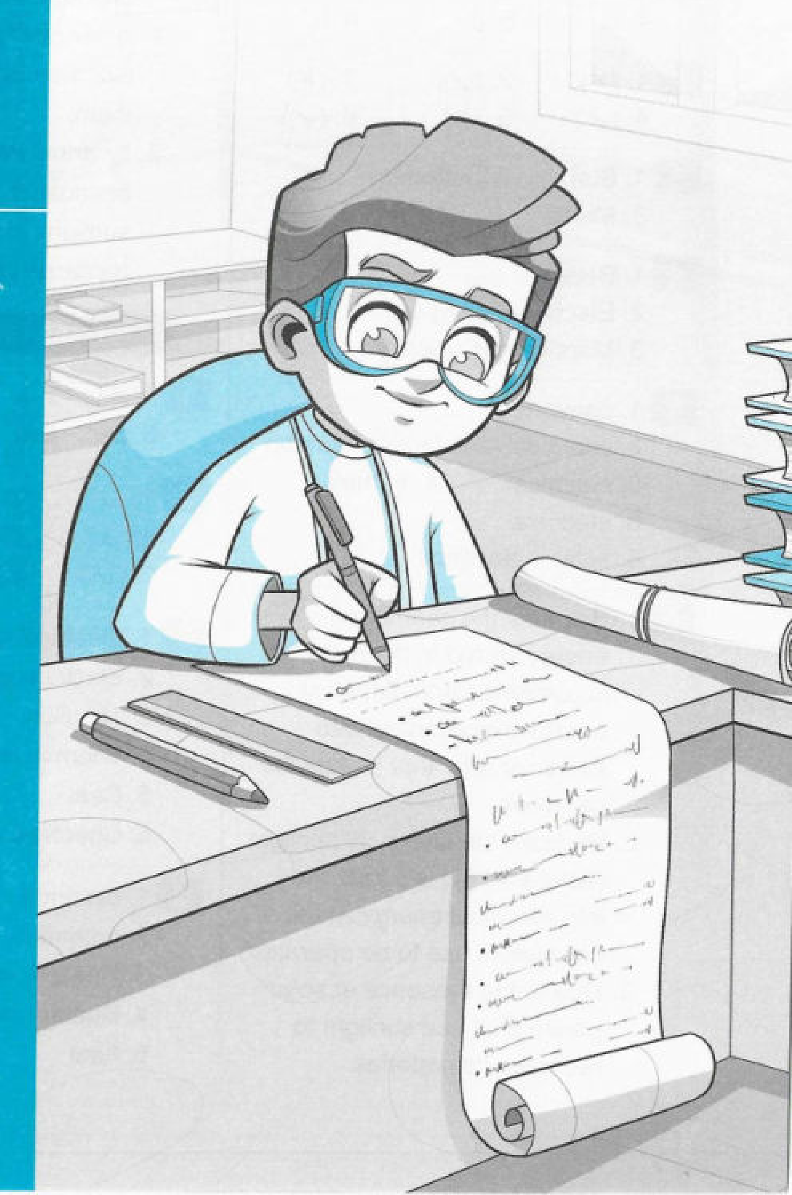
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Part

1

Guide Answers of Exercises on Lessons



PART 1

UNIT THREE : Energy and Fuels

Concept (3.1)

Exercises on Lesson 1

1
1. a 2. a 3. c
4. c 5. d 6. b

2
1. (✗) 2. (✓) 3. (✗)
4. (✓) 5. (✗) 6. (✓)

3
1. Sun 2. batteries
3. Mars.

4
1. Battery.
2. Electrical energy.
3. Mars rover Curiosity.

5
1. converted
2. chemical – electrical – kinetic
3. electrical 4. battery
5. electrical
6. solar – electrical

6
1. Because the chemical energy stored in the battery is converted into electrical energy that changes into kinetic energy that makes the car move.
2. Because the energy of sunlight (solar energy) is converted into electrical energy which calculators use to be operated.
3. Due to the presence of solar panels that use sunlight to recharge its batteries.

7
1. The car will not move, so we can recharge its batteries by connecting toy car to a nearby charger or replacing old batteries with new ones.
2. Solar energy is converted into electrical energy that operate them.
3. It cannot be operated, because it depends on sunlight (solar energy) to recharge its battery.

Exercises on Lesson 2

1
1. a 2. b 3. a 4. c
5. d 6. a

2
1. (✓) 2. (✗) 3. (✗)
4. (✓) 5. (✓) 6. (✗)
7. (✓) 8. (✗)

3
1. Electrical energy.
2. Electrical energy.
3. The Sun.
4. Thermal energy.
5. Coal.
6. Chemical energy.

4
1. electrical
2. potential – kinetic
3. kinetic – sound
4. kinetic – thermal
5. heat.

5
1. Because the potential energy stored in its spring is converted into kinetic energy that moves the soap upward.
2. Because the kinetic energy is converted into thermal energy.
3. Because some of the energy is wasted in the form of heat.

6
1. The electrical energy is converted into sound energy and light energy.
2. The chemical energy is converted into thermal energy and light energy.

7
1. Chemical – Thermal – Light.
2. Chemical – Thermal – Kinetic – Electrical – Kinetic – Sound.

Exercises on Lesson 3

1
1. b 2. a 3. d 4. a 5. b
6. d 7. d 8. c 9. a 10. b

2
1. (✓) 2. (✗) 3. (✓) 4. (✗)
5. (✗) 6. (✓)

3
1. Light energy.
2. The law of conservation of energy.
3. Sound energy.
4. Kinetic energy.
5. Electrical energy.

4
1. chemical – kinetic
2. thermal
3. electrical – thermal
4. conservation of energy.
5. created – destroyed – converted
6. light – thermal

5
1. Because some of the electrical energy is converted into thermal energy.
2. Because battery is the source of energy where the chemical energy is converted into electrical energy to operate the toy car.

6
1. You feel warm, because some electrical energy is converted into thermal energy.
2. The kinetic energy is converted into sound energy.

7
1. chemical
2. electrical
3. chemical – electrical – light – thermal

Exercises on Lesson 4

1
1. a 2. b 3. a 4. d
5. c 6. b 7. a 8. c

2
1. (✗) 2. (✓) 3. (✗)
4. (✗) 5. (✓) 6. (✓)

3
1. Chemical energy.
2. Electrical energy.
3. Thermal energy.
4. Kinetic energy.
5. Thermal energy.

4 1. light – sound
2. thermal
3. electrical – thermal – kinetic – sound
4. sound – thermal
5. kinetic
6. electrical – light – thermal
7. electrical – chemical
8. electrical – output
9. input – output

5 1. Because it doesn't help the mobile phone to do its main function.
2. Because it is converted into kinetic, thermal and sound energies.
3. Because they don't help the blender to do its main function.

6 1. Some energy is wasted as thermal energy.
2. The electrical energy is converted into kinetic energy which do the main function of fan and sound energy as wasted energy.

7 2 ⟶ 4 ⟶ 1 ⟶ 3 ⟶ 5

Model Exam (1) on Concept (3.1)

1 (A) 1. c 2. c 3. a 4. d
(B) Solar energy is converted into electrical energy that operates them.

2 (A) 1. (✗) 2. (✗) 3. (✓) 4. (✓)
(B) 1. chemical – electrical
2. electrical – light – thermal
3. chemical – electrical – light – thermal

3 (A) 1. Electrical energy.
2. Kinetic energy.
3. Electrical energy.
4. Thermal energy.
(B) 1. (✓) 2. (✗) 3. (✓) 4. (✗)

Model Exam (2) on Concept (3.1)

1 (A) 1. b 2. a 3. d 4. a
(B) You feel warm, because some electrical energy is converted into thermal energy.

2 (A) 1. Mars 2. Sun
3. chemical 4. electrical
(B) Because it doesn't help mobile phone to do its main function.

3 (A) 1. Electrical energy.
2. The law of conservation of energy.
3. Thermal energy.
4. Sound energy.
(B) 1. b ⟶ C
2. c ⟶ A
3. a ⟶ B

Concept (3.2)

Exercises on Lesson 1

1 1. d 2. d 3. c 4. b

2 1. b 2. d 3. c

3 1. (✗) 2. (✓) 3. (✓)
4. (✓) 5. (✓)

4 1. thermal
2. The Sun
3. thermal energy

5 1. The Sun.
2. Thermal energy.
3. Fuel.

6 1. thermal – kinetic
2. coal – natural gas – wood.
3. coal – wood

7 1. Because fuel is burned inside the engines to produce thermal energy that is changed into kinetic energy which causes the different means of transportation to move.
2. Because the fuel in the car tank runs out.
3. To produce thermal energy which changes into kinetic energy that causes the car to move.

8 1. The car fuel indicator will go down.
2. The car movement decreases gradually until it stops.

9 1. b 2. a 3. d

Exercises on Lesson 2

1 1. d 2. b 3. a 4. b
5. d 6. a 7. b 8. c

2 1. d 2. c 3. a

3 1. (✗) 2. (✗) 3. (✗) 4. (✗)
5. (✗) 6. (✓) 7. (✓)

4 1. a small 2. wood
3. a long 4. The Sun
5. plants 6. decreased.
7. biofuels 8. Natural gas
9. reducing

5 1. Renewable resources of energy.
2. Nonrenewable resources of energy.
3. Liquid fuel.
4. Fossil fuels.
5. Coal.
6. Oil.

6 1. renewable – natural gas
2. renewable
3. nonrenewable
4. biofuels – fossil fuels.
5. biofuel – charcoal.
6. charcoal – oil – coal
7. liquid
8. sea creatures – pressure.

7 1. Because they can be replaced shortly after being used.
2. Because they are used at a rate faster than they can be renewed.
3. Because continuity of cutting down trees leads to deforestation.

8 1. It leads to deforestation, which causes negative effects on the environment.
2. They are converted into fossil fuel.
3. They will form oil and natural gas.

Exercises on Lesson 3

1 1. d 2. c 3. b 4. a
5. b 6. c 7. a 8. d
9. c

2 1. d 2. c 3. a

3 1. (✓) 2. (✓) 3. (✓)
4. (✗) 5. (✗) 6. (✓)

4 1. natural gas. 2. heat
3. renewable 4. kinetic energy
5. electrical

5 1. Fossil fuel. 2. Turbine.
3. Water. 4. Generator.

6 1. nonrenewable
2. renewable – electricity.
3. thermal
4. kinetic – electrical
5. steam
6. kinetic – generators
7. thermal – kinetic

7 1. Because generators convert kinetic energy into electrical energy.
2. To conserve the electricity.

8 1. Turbine cannot produce kinetic energy, so the generator will not turn and don't generate electricity.
2. Water will not produce steam, so the turbine will not move and will not produce kinetic energy.

9 1. c 2. a 3. b
4. d 5. a

10 1. (✓) 2. (✗) 3. (✓) 4. (✗)

11 (3) Steam turns the turbine ...
(1) Fuel is burned ...
(5) Electrical energy is sent ...
(2) Water becomes hot ...
(4) Turbine turns the generator ...

Exercises on Lesson 4

1 1. d 2. c 3. b 4. a
5. b 6. a 7. c 8. d
9. d 10. a 11. c 12. a
13. c

2 1. d 2. c 3. a

3
1. (✗) 2. (✓) 3. (✗) 4. (✓)
5. (✗) 6. (✓) 7. (✗) 8. (✓)
9. (✓) 10. (✓)

4
1. nonrenewable resources
2. fossil fuels 3. pollute
4. renewable 5. Renewable
6. biofuel 7. increase
8. Nonrenewable

5
1. Global warming.
2. Respiratory system.
3. Acid rain.
4. Fossil fuels.
5. Global warming.

6
1. soil – water.
2. air – soil – water
3. air – eyes – lungs
4. smog – respiratory
5. carbon dioxide – water – rain
6. carbon dioxide – air
7. fish.
8. carbon dioxide – global warming.
9. soil – acid
10. solar energy – wind energy.
11. temperature – climate.
12. gases – heat.
13. fossil
14. renewable.
15. renewable – water – wind.

7
1. Because the smog of cars causes irritation of human's eyes and lungs.
2. Because pesticides cause the pollution of soil and water.
3. Because burning fossil fuel produces carbon dioxide gas which combines with water in air forming acid rain.
4. Because burning coal and oil produces carbon dioxide gas which forms a layer in atmosphere that traps heat on Earth causing rise in Earth's temperature that causes global warming.
5. Because acid rain causes dissolving of some rocks including the rocks used for building.
6. Because fossil fuels are formed over millions of years.
7. Because when fossil fuels are burned, they release gases that cause air pollution.

8
1. It causes the pollution of water and soil.
2. The pollution of air, water and soil will decrease.
3. It causes dissolving of the rocks used for building.
4. The amount of carbon dioxide gas in air will decrease.
5. Fossil fuel will run out on the Earth.
6. The Earth's temperature will not increase.

9 1. c 2. b 3. c 4. b

10 1. d 2. b 3. c 4. a

Exercises on Lesson 5

1 1. d 2. c 3. d

2 1. b 2. d 3. a

3 1. (✓) 2. (✗) 3. (✗) 4. (✗)

4 1. Solar energy.
2. Coal.
3. Walking or using bicycles instead of driving a car.
4. Air pollution.
5. Not increasing the Earth's temperature.

Model Exam (1) on Concept (3.2)

1 (A) 1. thermal
2. biofuels 3. fossil fuels
4. pollute
(B) The Earth's temperature will not increase.

2 (A) 1. b 2. d 3. c 4. d
(B) Because the continuity of cutting trees leads to deforestation.

3 (A) 1. coal – natural gas.
2. kinetic – electrical
3. renewable
4. biofuels – fossil fuels.
(B) 1. d 2. c 3. a

Model Exam (2) on Concept (3.2)

1 (A) 1. d 2. a 3. b 4. d
(B) Because generators convert kinetic energy into electrical energy.

2 (A) 1. The Sun.
2. Oil.
3. Renewable energy resources.
4. Generator.
(B) Fossil fuels will run out on the Earth.

3 (A) 1. (✗) 2. (✓)
3. (✓) 4. (✗)
(B) Charcoal (All items are fossil fuels except charcoal is a biofuel).

Concept (3.3)

Exercises on Lesson 1

1 1. a 2. b 3. a 4. b
5. c 6. d 7. d 8. a
9. c 10. b 11. c

2 1. b 2. c 3. a

3 1. (✗) 2. (✓) 3. (✗) 4. (✗)
5. (✓) 6. (✗) 7. (✓) 8. (✗)
9. (✓) 10. (✗) 11. (✓)
12. (✓) 13. (✓)

4 1. solar 2. water flow.
3. Electric 4. low
5. the Sun 6. light

5
1. Watermill. 2. Windmill.
3. Electrical energy.
4. Wind turbine.
5. Convergent (concave) mirrors.
6. Greenhouses.
7. Solar water heater.

6
1. thermal – kinetic
2. blades – electrical
3. windmills – watermills
4. kinetic
5. kinetic – electrical
6. Sun – radiant
7. warm.
8. concave mirrors – sunlight
9. thermal – warm

7
1. Because they helped them to crush grain to make flour.
2. Because the atomsphere, land and water of Earth absorb the thermal energy of the Sun which causes increasing in the Earth's temperature.

8
1. The blades of wind turbines don't move and also don't generate electricity.
2. The solar energy of the Sun is converted into electrical energy.
3. The greenhouse absorbs the radiant energy from the Sun and convert it into thermal energy.

9 thermal → Kinetic; Kinetic and kinetic → Electrical

10
1. (–) 2. (–)
3. (✓) 4. (✓)

Exercises on Lesson 2

1
1. a 2. b 3. d 4. a
5. d 6. b 7. d 8. a

2
1. (✗) 2. (✓) 3. (✗)
4. (✗) 5. (✗) 6. (✓)

3
1. electrical 2. kinetic
3. move. 4. Wind
5. faster.

4
1. Solar panel.
2. Wind.
3. Wind turbine.
4. Electrical energy.

5
1. electrical
2. electrical – batteries.
3. electrical – irrigation
4. radiant – Sun
5. temperatures
6. kinetic
7. kinetic – electrical
8. faster 9. electrical
10. kinetic – increase.

6
1. To absorb the solar energy coming from the Sun and convert it into electrical energy.

2. Because by increasing kinetic energy of the wind, the blades rotate faster and wind turbine generates more electricity.
3. Because sometimes the wind doesn't blow, so their blades don't move, so wind turbines don't generate electricity.

7
1. The solar cells absorb solar energy and convert it into electrical energy that is used to charge the battery of calculator.
2. Its blades rotate faster and generates more electricity.
3. It causes the movement of air and wind blowing.

8

	Used energy	Produced energy
1.	Solar	Electrical
2.		Electrical

9
1. Radiant 2. Thermal
3. Kinetic 4. Electrical
5. Kinetic
6. Sound – thermal

Exercises on Lesson 3

1
1. a 2. b 3. c 4. b 5. a
6. c 7. a 8. d 9. c 10. b
11. b 12. a 13. d

2
1. (✗) 2. (✓) 3. (✗) 4. (✓)
5. (✗) 6. (✓) 7. (✗) 8. (✓)
9. (✗)

3
1. electrical 2. gravitational
3. electrical 4. water

4
1. Water turbine.
2. Hydroelectric energy.
3. Hydroelectric dam.
4. Water turbine.
5. Evaporation process.
6. Water cycle.
7. Condensation process.

5
1. gravitational potential – kinetic
2. dams – potential – electrical
3. water – potential
4. hydroelectric energy.
5. wind – kinetic – electricity.
6. turbine
7. dams – wind.
8. turbines
9. the Sun – wind – water.
10. turbines
11. kinetic – electrical
12. evaporation – condensation
13. kinetic – hydroelectric

6
1. To control the water flow and increase the potential energy of water to generate electricity.
2. Because water turbines convert kinetic energy of flowing water into electrical energy.
3. Because kinetic energy of moving water in dams is used to rotate water turbines to generate hydroelectric energy.

7 1. Potential energy of water behind dams is converted into kinetic energy which causes water turbines rotate and generate electricity.
2. It converts into more kinetic energy which causes water turbines rotate faster and generate more electricity.
3. Clouds are formed and rain may fall.

8 1. Potential 2. Kinetic
3. Electrical 4. Light – sound
5. Thermal

9

Points of comparison	Wind turbines	Water turbines
Energy used :	**Kinetic** energy of wind.	**Kinetic** energy of water.
Type of used energy :	Renewable energy.	**Renewable** energy.
Produced energy :	**Electrical** energy.	**Electrical** energy.

10 1. (3) 2. (1) 3. (4) 4. (2)

Model Exam (1) on Concept (3.3)

1 (A) 1. Electrical energy.
2. The Sun.
3. Wind turbine.
4. Solar water heater.

(B) To control the water flow and increase the potential energy of water to generate electricity.

2 (A) 1. light 2. faster.
3. solar 4. gravitational
(B) The solar panels will absorb the solar energy coming from the Sun and convert it into electrical energy.

3 (A) 1. (✓) 2. (✗)
3. (✓) 4. (✗)
(B) 1. Potential 2. Kinetic
3. Electrical
4. Light – sound
5. Thermal

Model Exam (2) on Concept (3.3)

1 (A) 1. b 2. c 3. c 4. a
(B) 1. Solar 2. Electrical

2 (A) 1. Water turbines.
2. Evaporation process.
3. Wind.
4. Greenhouse.
(B) They are used in crushing grain to make flour.

3 (A) 1. (✓) 2. (✓)
3. (✗) 4. (✗)
(B) Because the atmosphere, land and water of Earth absorb the thermal energy of the Sun which causes increasing in the Earth's temperature.

Concept (4.1)

Exercises on Lesson 1

1 1. c 2. a 3. d 4. c
5. d 6. c 7. b

2 1. d 2. c 3. b

3 1. (✓) 2. (✓) 3. (✓) 4. (✗)
5. (✓) 6. (✗) 7. (✗)

4 1. Erosion of the sandcastle.
2. Canyons. 3. Costal rocks.

5 1. water 2. rocks 3. wind.
4. erosion. 5. fast – slow

6 Because they are formed due to the slow changes that happened to their rocks over many years.

7 The shape of costal rocks will change due to breaking down of some parts of rocks.

8 1. b 2. c

Exercises on Lesson 2

1 1. a 2. b 3. a 4. b
5. d 6. b 7. a 8. c
9. d 10. c

2 1. (✓) 2. (✗) 3. (✗) 4. (✓)
5. (✗) 6. (✓) 7. (✗) 8. (✗)
9. (✓) 10. (✗)

3 1. Weathering. 2. Erosion.
3. Deposition. 4. Plant roots.
5. Weather.
6. Chemical weathering.
7. Limestone caves.
8. Freezing process.
9. Oxygen gas.

4 1. weathering
2. mechanical – chemical
3. mechanical 4. chemical
5. acids 6. erosion
7. chemical 8. minerals
9. friction
10. rocks – mechanical

5 1. Due to the reaction between iron and oxygen of air.
2. Because water dissolves minerals in rocks, then this dissolved minerals combine again forming new shapes.

6 1. The minerals of these rocks dissolve causing their breaking down.
2. These rocks become weak and can break down easily.

7 1. M 2. C 3. C
4. M 5. M 6. M

8 1. (✗) 2. (✓) 3. (✗) 4. (✗)

Exercises on Lesson 3

1 1. a 2. b 3. b 4. a

2 1. (✗) 2. (✓) 3. (✓) 4. (✓)

3 1. Weathering.
2. Mechanical weathering.
3. Chemical weathering.

4 1. mechanical 2. mechanical
3. chemical 4. chemical

Exercises on Lesson 4

1 1. c 2. d 3. a 4.d
5. c 6. b 7. c 8.c
9. b

2 1. (✓) 2. (✓) 3. (✓) 4. (✗)
5. (✗) 6. (✗) 7. (✓) 8. (✓)
9. (✗)

3 1. Erosion. 2. Deposition.
3. A delta. 4. A sand dune.
5. Sediments. 6. Gravity.

4 1. water 2. wind
3. wind – water
4. wind 5. sand grains
6. sand dunes

5 1. Because the sediments are deposited at the end of the river.
2. Because they are formed by the effect of weak winds.
3. Because they are formed by the effect of strong winds.

6 A delta may be formed.

7 1. (2) 2. (1)

Exercises on Lesson 5

1 1. c 2. a 3. b 4. d

2 1. (✗) 2. (✓) 3. (✗)

3 1. Canyons. 2. Erosion.
3. Deposition

4 1. rocks. 2. mechanical
3. mechanical 4. winds

5 1. 2 2. 1 3. deposition

Model Exam (1) on Concept (4.1)

1 (A) 1. d 2. b 3. c 4. d
(B) Due to the reaction of oxygen gas that is present in air with iron.

2 (A) 1. (✓) 2. (✓)
3. (✓) 4. (✗)
(B) The acids dissolve minerals that are present in these rocks.

3 (A) 1. Erosion process.
2. Chemical weathering.
3. Delta. 4. Canyons.
(B) 1. b 2. c

Model Exam (2) on Concept (4.1)

1 (A) 1. c 2. b 3. a 4. c

(B) Because they are formed due to the slow change that happened to their rocks over many years.

2 (A) 1. (✓) 2. (✓) 3. (✗) 4. (✓)

(B) A delta may be formed.

3 (A) 1. chemical 2. wind 3. dunes 4. mechanical

(B) 1. (2) 2. (1)

Concept (4.2)

Exercises on Lesson 1

1 1. b 2. c 3. c 4. a 5. c 6. b

2 1. (✓) 2. (✗) 3. (✓) 4. (✓) 5. (✗) 6. (✗) 7. (✓) 8. (✓) 9. (✗)

3 1. Canyon.

2. Weathering and erosion processes.

4 1. impression 2. canyon 3. water. 4. gently

5 Due to flow of water stream which is needed by plants to grow.

6 1. A small canyon may be formed.

2. The small canyon could get deeper.

Exercises on Lesson 2

1 1. b 2. a 3. d 4. b 5. a 6. c 7. d 8. b

2 1. (✗) 2. (✓) 3. (✓) 4. (✓) 5. (✗) 6. (✓) 7. (✗)

3 1. wind 2. valleys 3. speed 4. sediments 5. gravity.

4 1. Because it may help in building houses in safe places.

2. Because the shape of a valley depends on several factors including :

- The type of rocks exist in the landscape.
- The speed, age and size of river that form the valley.

5 1. It causes weathering and erosion of the house.

2. A canyon may be formed.

6 1. Wealhering 2. Deposition 3. Erosion

Exercises on Lesson 3

1 1. c 2. b 3. a
4. b 5. c 6. d

2 1. (✓) 2. (✗) 3. (✓)
4. (✗) 5. (✗) 6. (✓)
7. (✓)

3 1. Valleys. 2. Delta.

4 1. rivers 2. speed
3. deposition 4. canyon.
5. silt – sand

5 Because they help in increasing the rate of deposition process.

6 A delta may be formed.

7 1. A – B 2. C 3. B
4. B – C – A

Exercises on Lesson 4

1 1. b 2. c 3. d 4. c
5. b 6. a 7. c

2 1. (✓) 2. (✓) 3. (✗)
4. (✗) 5. (✗) 6. (✗)
7. (✗) 8. (✓)

3 1. Erosion process.
2. Sand dunes.

4 1. rocks 2. wind.
3. decreases 4. hundreds
5. direction

5 1. Because the large rock can block the path of sand which is carried by wind.
2. Because the strong wind can move the sand for a longer distance than the weak wind.

6 Sand dunes may be formed.

7 (3) Flying sediment ....
(1) Blowing of wind ....
(4) The sediment carves ....
(2) Wind start to ....

Model Exam (1) on Concept (4.2)

1 (A) 1. a 2. b 3. b 4. c
(B) A canyon may be formed.

2 (A) 1. (✓) 2. (✗)
3. (✗) 4. (✗)
(B) Because the shape of a valley depends on several factors including :
- The type of rocks exist in the landscape.
- The speed, age and size of river that form the valley.

3 (A) 1. rocks 2. wind.
3. decreases 4. hundreds
(B) 1. A – B 2. C 3. B

Model Exam (2) on Concept (4.2)

1 (A) 1. Canyon.
2. Erosion process.
3. Weathering and erosion processes.
4. Valleys.

(B) 1. deposition 2. canyons.

2 (A) 1. increases.
2. gravity.
3. direction
4. deposition

(B) A delta may be formed.

3 (A) 1. (✗) 2. (✓) 3. (✗) 4. (✗)

(B) (3) Flying sediments ....
(1) Blowing of wind ....
(4) The sediments carve ....
(2) Wind starts to ....

Part

2

Guide Answers of Self-Assessments



PART 2 UNIT THREE : Energy and Fuels

Concept (3.1)

Self-Assessment 1

1 (A) 1. (✗) 2. (✓) 3. (✗)
(B) Because it contains solar panels that convert solar energy into electrical energy which is used to charge the robot's batteries.

2 (A) 1. Sound energy.
2. Chemical energy.
3. Mars rover Curiosity.
(B) 1. Remote controlled toy car.
2. Mars rover Curiosity.

3 1. d 2. c 3. d

Self-Assessment 2

1 (A) 1. kinetic – thermal
2. kinetic – thermal
3. thermal – kinetic
(B) Because it is converted into kinetic energy which is used to operate certain equipment in electric power stations.

2 (A) 1. (✗) 2. (✗) 3. (✓)
(B) The potential energy is converted into kinetic energy that moves the soap upward.

3 1. light – chemical
2. thermal 3. chemical
4. electrical

Self-Assessment 3

1 (A) 1. a 2. c 3. b
(B) The kinetic energy is converted into thermal energy.

2 (A) 1. conservation
2. chemical 3. thermal
(B) 1. Blender.
2. Washing machine.

3 1. (2) – (3) – (4)
2. (3) – (4)

Self-Assessment 4

1 (A) 1. thermal – kinetic
2. kinetic – input
3. chemical – electrical
(B) Because they don't help the vacuum cleaner do its main function.

2 (A) 1. Electrical energy.
2. Thermal energy.
3. Kinetic energy.
(B) 1. Electrical energy.
2. Thermal energy.

3 1. (2) 2. (1) – (3)
3. (1) – (3)
4. electrical – electric power

Model Exam on Concept (3.1)

1 (A) 1. b 2. c 3. a 4. d

(B) You feel warm because some electrical energy is converted into thermal energy.

2 (A) 1. (✓) 2. (✗) 3. (✗) 4. (✓)
(B) 2 ⟶ 4 ⟶ 1 ⟶ 3 ⟶ 5

3 (A) 1. Chemical 2. batteries 3. sound 4. Sun
(B) Because the potential energy stored in the spring of soap dispenser is converted into kinetic energy that moves the soap upward.

Concept (3.2)

Self-Assessment 5

1 (A) 1. c 2. c 3. d
(B) They are used as a source of thermal energy for cooking food and warming houses.

2 (A) 1. (✗) 2. (✓) 3. (✓)
(B) - Wood.
- Coal.
- Natural gas.

3 1. Gasoline. 2. Wood.
3. Thermal energy.
4. The Sun.

Self-Assessment 6

1 (A) 1. d 2. c 3. d
(B) Because biofuel can be replaced shortly after being used.

2 (A) 1. (✓) 2. (✗) 3. (✗)
(B) Sea creatures will be decomposed and converted into oil.

3 1. b 2. c 3. d 4. a

Self-Assessment 7

1 (A) 1. c 2. b 3. d
(B) The generator cannot convert the kinetic energy into electrical energy.

2 (A) 1. (✓) 2. (✗) 3. (✓)
(B) 1. nonrenewable
2. steam.
3. wires.

3 1. Turbine. 2. Generator.
3. Coal. 4. Steam.

Self-Assessment 8

1 (A) 1. b 2. b 3. c
(B) Because burning coal and oil produces carbon dioxide gas which forms a layer in atmosphere that traps heat on Earth causing the increase of Earth's temperature.

2 (A) 1. (✗) 2. (✗) 3. (✓)
(B) The Earth's temperature will increase.

3 1. b 2. c 3. a

Self-Assessment 9

1 (A) 1. c 2. b 3. d

(B) Because when fossil fuels are burned, they release gases that trap heat in the atmosphere, so the temperature of the Earth increases and changes its climate.

2 (A) 1. (✓) 2. (✗) 3. (✓)

(B) People will suffer from irritation of their eyes and lungs and their respiratory system may be damaged.

3 .... gases .... heat .... raises .... global warming ....

Model Exam on Concepts (3.1) & (3.2)

1 (A) 1. a 2. a 3. c 4. b

(B) Because the chemical energy stored in the battery is converted into electrical energy that in turn changes into kinetic energy that makes the car move.

2 (A) 1. (✓) 2. (✓) 3. (✗) 4. (✗)

(B) It causes pollution of water and soil.

3 (A) 1. conservation of energy.
2. kinetic 3. heat.
4. Mars.

(B) 1. The Sun.
2. Renewable resources of energy.

Concept (3.3)

Self-Assessment 10

1 (A) 1. c 2. b 3. d

(B) To generate electricity.

2 (A) 1. (✗) 2. (✗) 3. (✓)

(B) It is converted into thermal energy that warms the inside of the greenhouses to allow farmers to plant crops that grow in warm climates.

3 1. greenhouse. 2. radiant
3. thermal 4. warm

Self-Assessment 11

1 (A) 1. solar panels – wind
2. wind
3. renewable

(B) To absorb the solar energy coming from the Sun and convert it into electrical energy.

2 (A) 1. (✗) 2. (✓) 3. (✗)

(B) Wind turbines rotate slower and generate less electricity.

3 1. Wind turbine (B), because the wind applied to it is stronger than the wind applied to wind turbine (A).
2. Wind turbine (A).

Self-Assessment 12

1 (A) 1. water 2. kinetic
3. thermal
(B) Because strong wind helps the blades of wind turbines rotate faster so more electricity is generated.

2 (A) 1. Coal. (All items are renewable energy resources, while coal is a nonrenewable energy resource).
2. Hand mixer. (All items depend on solar energy, while hand mixer depends on kinetic energy).
3. Wind. (All items are nonrenewable energy resources, while wind is a renewable energy resource).

(B)

P.O.C	Water turbines	Solar panels
1. Source of energy that is used to operate it :	**Water.**	**The Sun.**
2. The produced energy :	**Electrical** energy.	**Electrical** energy.

3 1. (✓) 2. (✗) 3. (✓) 4. (✗)

Model Exam on Theme (3)

1 (A) 1. chemical – electrical – kinetic
2. kinetic – thermal
3. oil – natural gas
4. wind
(B) They are used to generate electrical energy.

2 (A) 1. (✗) 2. (✓)
3. (✓) 4. (✓)
(B) Because generators convert kinetic energy into electrical energy.

3 (A) 1. Solar panel.
2. Fuel.
3. Mars rover Curiosity.
4. Kinetic energy.
(B) The car movement decreases gradually until it stops.

Assess Your Learning on Theme (3)

1. b 2. b 3. c 4. b
5. c 6. 2-3-1-4-5 7. a
8. c 9. c 10. b 11. d
12. (1) Electrical energy.
(2) Light energy.
(3) Thermal energy.
13. 1. Kinetic energy of moving water.
2. Electrical energy (hydroelectric energy).
3. Potential energy.
4. Electrical energy (hydroelectric energy).

UNIT Four : Shifting Surfaces

Concept (4.1)

Self-Assessment 13

1 (A) 1. canyon. 2. fast 3. slow

(B) Disappearance of a sandcastle (all items are examples of slow changes, while disappearance of a sandcastle is an example of fast changes).

2 (A) 1. (✗) 2. (✓) 3. (✓)

(B) Because the sea waves hit the sandcastle.

3 1. years – slow

2. minutes – fast

Self-Assessment 14

1 (A) 1. erosion. 2. Weathering 3. roots

(B) The cracks becomes wider, then broken into small pieces.

2 (A) 1. (✓) 2. (✓) 3. (✗)

(B) Because plant roots grow inside cracks of rocks that become wider, then broken into small pieces.

3

Mechanical weathering	Chemical weathering
Number (3) Number (4)	Number (1) Number (2) Number (5) Number (6)

Self-Assessment 15

1 (A) 1. (✗) 2. (✓) 3. (✗)

(B) Because another substance is formed as a result of chemical reactions.

2 (A) 1. chemical – mechanical 2. water. 3. weathering

(B) Another substance is formed as a result of chemical reactions.

3

Factors cause mechanical weathering	Factors cause chemical weathering
– wind – water – temperature – plant roots	– acids – water – oxygen gas

Self-Assessment 16

1 (A) 1. erosion 2. gentle 3. delta

(B) Freezing of water inside rock cracks. (All items are caused by chemical weathering, while freezing of water inside rock cracks causes mechanical weathering.

2 (A) 1. (✗) 2. (✓) 3. (✗)

(B) The broken weathered rocks are pulled down at the mountainsides.

3 1. (✗) 2. (✗) 3. (✓)

Self-Assessment 17

1 (A) 1. sand dunes.
2. Weathering
3. deposition
(B) Because there is no eroded materials reach to another place to be laying down.

2 (A) 1. (✓) 2. (✓) 3. (✗)
(B) Neither erosion nor deposition occur, so no reshaping of the Earth's surface happened.

3 1. (✓) 2. (✗) 3. (✓)
4. (✗)

Model Exam on Concept (4.1)

1 (A) 1. Erosion process.
2. Limestone caves.
3. Deposition process.
4. Sand dune.
(B) The rocks become weaker and easily to break down.

2 (A) 1. c 2. a 3. a 4. b
(B) Because it dissolves minerals that present in rocks which form new shapes.

3 (A) 1. weathering
2. chemical
3. wind.
4. mechanical
(B) 1. deposition.
2. gentle

Concept (4.2)

Self-Assessment 18

1 (A) 1. b 2. d 3. c
(B) Due to the help of water in eroding the sides down.

2 (A) 1. (✗) 2. (✗) 3. (✓)
(B) The sides of the canyon could get deeper.

3 1. A – B 2. B 3. A 4. B

Self-Assessment 19

1 (A) 1. V-shape. 2. Sinai.
3. type.
(B) Because if the path of the river is changed, it causes weathering and erosion of their houses.

2 (A) 1. (✓) 2. (✗) 3. (✓)
(B) A small canyon may be formed.

3 (A) 1. b 2. c 3. a

Self-Assessment 20

1 (A) 1. b 2. c 3. a
(B) Because the fast flow of water can erode a lot of sediments and carry them away, that leads to the formation of canyons.

2 (A) 1. millions 2. erosion
3. triangular
(B) A canyon may be formed.

3 1. Picture (A). 2. Picture (B).
3. weathering and erosion

Self-Assessment 21

1 (A) 1. d 2. c 3. a
(B) Because they are partly responsible for slowing down the river water and help in trapping sediments.

2 (A) 1. deposition 2. valleys
3. Sand dunes
(B) The river drops the sediments it is carrying, forming deltas.

3 No, because in the area (A) the speed of water is still fast and also area (A) is not a point of meeting the river with the ocean.

Self-Assessment 22

1 (A) 1. erosion
2. decreases
3. increases
(B) Because sand dunes are often formed when something blocks the path of sand as large rocks.

2 (A) 1. (✗) 2. (✓) 3. (✓)
(B) The sand travels for long distances.

3 1. Weathering – erosion
2. Deposition
3. Erosion – deposition

Model Exam on Theme (4)

1 (A) 1. (✓) 2. (✓) 3. (✗)
4. (✓)
(B) Because if the path of the river is changed, it causes erosion and deposition of their houses.

2 (A) 1. c 2. a 3. d 4. a
(B) The sedimentary rocks are formed.

3 (A) 1. rivers 2. speed
3. deposition 4. canyon.
(B) 1. Weathering 2. Deposition
3. Erosion

Assess Your Learning on Theme (4)

1. a	2. d	3. b	4. c
5. a	6. a	7. c	8. a
9. b	10. a	11. c	12. c
13. 1. b		2. c	3. a

Part

3

Guide Answers of Final Examinations



PART 3 Model Examinations

El-Moasser Final Examination Models

Model Exam 1

1 (A) 1. a 2. c 3. d 4. a

(B) Minerals of rocks are dissolved causing their breaking down.

2 (A) 1. (✗) 2. (✗) 3. (✗) 4. (✓)

(B) 1. deposition 2. Valleys

3 (A) 1. Electric bulb.

2. Renewable resources of energy.
3. Wind.
4. Electrical energy.

(B) To conserve the electricity.

Model Exam 2

1 (A) 1. a 2. b 3. d 4. a

(B) Due to the reaction between iron and oxygen of air.

2 (A) 1. windmills – watermills

2. heat.
3. charcoal – oil – coal
4. chemical – kinetic

(B) A canyon is formed.

3 (A) 1. increases. 2. gentle

3. heat.
4. deposition process.

(B) 1. (✓) 2. (✗)

Model Exam 3

1 (A) 1. a 2. a 3. d 4. d

(B) Because fossil fuel is formed over millions of years.

2 (A) 1. Mars. 2. renewable 3. electrical 4. batteries

(B) Electrical energy changes into kinetic energy.

3 (A) 1. d 2. c 3. a 4. b

(B) 1. (2) – (3) – (4)

2. (3) – (4)

Model Exam 4

1 (A) 1. b 2. b 3. b 4. a

(B) Because they help in increasing the rate of deposition process.

2 (A) 1. Evaporation.

2. Gasoline.
3. Fossil fuel.
4. Electric bulb.

(B) We can recharge its batteries by connecting toy car to a nearby charger or replacing old batteries with new ones.

3 (A) 1. (✓) 2. (✓) 3. (✗) 4. (✗)

(B) 1. Solar – thermal

2. Kinetic – Electrical

Model Exam 5

1 (A) 1. c 2. c 3. b 4. c

(B) The car fuel indicator will go down.

2 (A) 1. (✗) 2. (✓) 3. (✓) 4. (✓)

(B) Because water dissolves minerals in rocks, then this dissolved minerals combine again forming new shapes.

3 (A) 1. warm. 2. changed 3. animals 4. wind

(B) 1. (B), because it is affected by strong wind.
2. (A)

Model Exam 6

1 (A) 1. d 2. b 3. d 4. a

(B) Oil and natural gas are formed.

2 (A) 1. water flow. 2. The Sun 3. solar 4. natural gas.

(B) Because it can be replaced shortly after it is used.

3 (A) 1. (✓) 2. (✗) 3. (✓) 4. (✗)

(B) 1. Chemical – Thermal – Light
2. Chemical – Thermal – Kinetic – Electric – Kinetic – sound

Model Exam 7

1 (A) 1. c 2. d 3. b 4. a

(B) The amount of produced electricity will decrease.

2 (A) 1. Concave mirrors.
2. Liquid fuel.
3. Water turbine.
4. Deposition process.

(B) Because solar panels absorb solar energy and convert it into electrical energy which calculators use to be operated.

3 (A) 1. Turbine. 2. Generator. 3. Coal. 4. Steam.

(B) 1. greenhouse. 2. radiant 3. thermal 4. warm

Model Exam 8

1 (A) 1. d 2. b 3. c 4. a

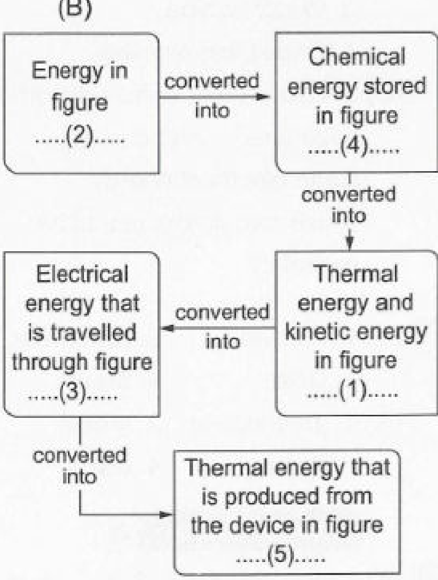
(B) Because the potential energy stored in the spring changes into kinetic energy that moves the soap upward.

2 (A) 1. mechanical – chemical
2. water – potential
3. electrical – irrigation
4. mechanical – chemical

(B) The electrical energy is converted into sound energy and light energy.

3 (A) 1. Wind. 2. Coal.
3. Walking or biking instead of driving a car.
4. Air pollution.

(B)



Model Exam 9

1 (A) 1. c 2. a 3. a 4. a
(B) It will not produce electrical energy.

2 (A) 1. (✗) 2. (✓)
3. (✗) 4. (✓)
(B) 1. Weathering process.
2. Erosion process.

3 (A) 1. rocks. 2. mechanical
3. conservation of energy.
4. renewable
(B) 1. Electrical energy.
2. Thermal energy.

Model Exam 10

1 (A) 1. c 2. b 3. d 4. c
(B) Because it is used at a rate faster than it can be renewed.

2 (A) 1. Water. 2. Watermill.
3. Deposition.
4. Chemical weathering.
(B) You feel warm, because some electrical energy is converted into thermal energy.

3 (A) 1. fossil fuel 2. electrical
3. rocks.
4. weathering (breaking down)
(B) 1. (2)
2. (1) – (3)

Final Examinations of Some Governorates

Cairo Governorate

1 Rod El Farag Edu. Zone

1 (A) 1. b 2. c 3. d 4. a
(B) Because wood produces thermal energy when it is burned.

2 (A) 1. (✓) 2. (✓) 3. (✗) 4. (✗)
(B) Kinetic energy changes into sound energy.

3 (A) 1. d 2. c 3. b 4. a
(B) 1. Water. 2. Coal.

2 El Nozha Edu. Zone

1 (A) 1. thermal energy.
2. Water
3. weathering process.
4. deposition
(B) Due to the reaction between iron and oxygen of air.

2 (A) 1. (✓) 2. (✗) 3. (✗) 4. (✓)
(B) The electrical energy is converted into sound energy and light energy.

3 (A) 1. d 2. c 3. a 4. b
(B) 1. Light energy
2. Electrical energy

3 Heliopolis Edu. Zone

1 (A) 1. a 2. b 3. d 4. c
(B) 1. The types of rocks exist in the landscape.
2. The speed, age and size of river that form the valley.

2 (A) 1. (✗) 2. (✗) 3. (✓) 4. (✗)
(B) 1. Kinetic 2. Electrical

3 (A) 1. Kinetic energy.
2. chemical weathering
3. sound energy.
4. canyons.
(B)

	Mechanical weathering	Chemical weathering
Effect of water factor :	Water runs over rocks and dissolves some substances in rocks then rocks are broken down.	When water dissolves minerals in a rock, the dissolved minerals combine again forming new shapes as in limestone caves.

4 El waily Edu. Zone

1 (A) 1. coal 2. hot.
3. changed 4. wind
(B) The Sun

2 (A) 1. c 2. a 3. a 4. b
(B) Wood. (All items belong to fossil fuel, while wood is considered as a biofuel).

3 (A) 1. (✗) 2. (✓) 3. (✗) 4. (✓)
(B) The electrical energy changes into light and thermal energies.

Giza Governorate

5 Dokki Edu. Zone

1 (A) 1. b 2. b 3. c 4. d
(B) The car movement decreases gradually until it stops.

2 (A) 1. (✗) 2. (✓) 3. (✓) 4. (✗)
(B) Sound energy.

3 (A) 1. temperature
2. kinetic
3. weathering
4. river
(B) Hand mixer. (All items depend on solar energy, while hand mixer depends on kinetic energy).

6 Agoza Edu. Zone

1 (A) 1. d 2. a 3. a 4. c
(B) Electrical energy changes into sound, light and thermal energies.

2 (A) 1. (✗) 2. (✓) 3. (✗) 4. (✗)
(B) Wind. (All items belong to nonrenewable energy resources, while wind is considered as a renewable energy resource).

3 (A) 1. b 2. d 3. a 4. c
(B) Mars.

Alexandria Governorate

7 Middle of Alex. Edu. Zone

1 (A) 1. (✓) 2. (✗) 3. (✗) 4. (✓)
(B) A delta may be formed.

2 (A) 1. sound 2. thermal
3. water 4. electricity.
(B) Hand mixer. (All items depend on solar energy, while hand mixer depends on kinetic energy).

3 (A) 1. c 2. a 3. d 4. a
(B) weak.

Qalyoubia Governorate

8 Qalyoubia Edu. Zone

1 (A) 1. c 2. b 3. b 4. b
(B) Photosynthesis. (All items are processes that change the shape of Earth's surface, while photosynthesis does not change the shape of Earth's surface).

2 (A) 1. (✓) 2. (✗) 3. (✗) 4. (✗)
(B) Chemical weathering.

3 (A) 1. d 2. c 3. b 4. a
(B) Gasoline.

Menoufia Governorate

9 Menoufia Edu. Zone

1 (A) 1. c 2. c 3. d 4. c
(B) 1. Electrical energy.
2. Light energy.
3. Thermal energy.

2 (A) 1. Fuel.
2. Deposition process.
3. Windmills or watermills.
4. Delta.
(B) 1. Wind. 2. Temperature.

3 (A) 1. d 2. b 3. c 4. a
(B) Because fossil fuels are formed over millions of years, so they cannot be replaced as quickly as we use them.

Dakahlia Governorate

10 Science Inspectorate

1 (A) 1. chemical 2. The Sun
3. Canyons 4. Deposition

(B) It dissolves minerals found in these rocks, causing the break down of rocks.

2 (A) 1. (✓) 2. (✗) 3. (✓) 4. (✗)
(B) Wind pushes the sand from a place to another, then friction occurs between sand and rocks causing their breaking down.

3 (A) 1. The law of conservation of energy.
2. Oxygen gas.

Device	Input energy	Output energy
1. Electric heater :	Electrical energy	Thermal energy
2. Hand bell :	Kinetic energy	Sound energy

(B) To control the water flow and increase the potential energy of water to generate electricity.

Ismailia Governorate

11 Science Inspectorate

1 (A) 1. nonrenewable
2. gravity.
3. electricity.
4. wind
(B) Due to the reaction between iron and oxygen of air.

2 (A) 1. d 2. c 3. c 4. b
(B) Valleys.

3 (A) 1. c 2. e 3. b 4. a
(B) A canyon may be formed.

Suez Governorate

12 South Edu. Zone

1 (A) 1. b 2. d 3. d 4. c
(B) Due to the reaction between iron and oxygen of air.

2 (A) 1. (✗) 2. (✓) 3. (✓) 4. (✗)
(B) Sand and soil.

3 (A) 1. rocks.
2. kinetic
3. decreases
4. thermal
(B) Sand dunes may be formed.

El-Behira Governorate

13 Kafr El-Dawar Edu. Zone

1 (A) 1. b 2. a 3. d 4. c
(B) Because fossil fuel is formed over millions of years.

2 (A) 1. (✗) 2. (✗) 3. (✓) 4. (✗)
(B) It forms red-colored rust and rocks become weak and break down easily.

3 (A) 1. Canyon
2. heat.
3. sound
4. Weathering process

(B)

Device	Consumed (input) energy	Produced (output) energy
1. Hair dryer :	Electrical energy.	Sound, kinetic and thermal energies.
2. Fan :	Electrical energy.	Kinetic energy.

Minia Governorate

14 Bani Mazar Edu. Zone

1 (A) 1. c 2. c 3. a 4. a
(B) You feel warm, because some electrical energy is converted into thermal energy.

2 (A) 1. (✗) 2. (✗) 3. (✓)
(B) 1. deposition
2. electrical

3 (A) 1. Kinetic energy.
2. Weathering process.
3. Windmill.
4. Fuel.
(B) 1. electrical energy.
2. thermal energy.

Qena Governorate

15 Science Inspectorate

1 (A) 1. c 2. a 3. c 4. a

(B) Due to the reaction between iron and oxygen of air.

2 (A) 1. (✗) 2. (✓) 3. (✓) 4. (✗)

(B) The electrical energy changes into light and thermal energies.

3 (A) 1. Chemical

2. natural gas.

3. sand dunes.

4. deposition

(B) Blender.